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The Naval Aviation Safety Review

U.S. NAVY

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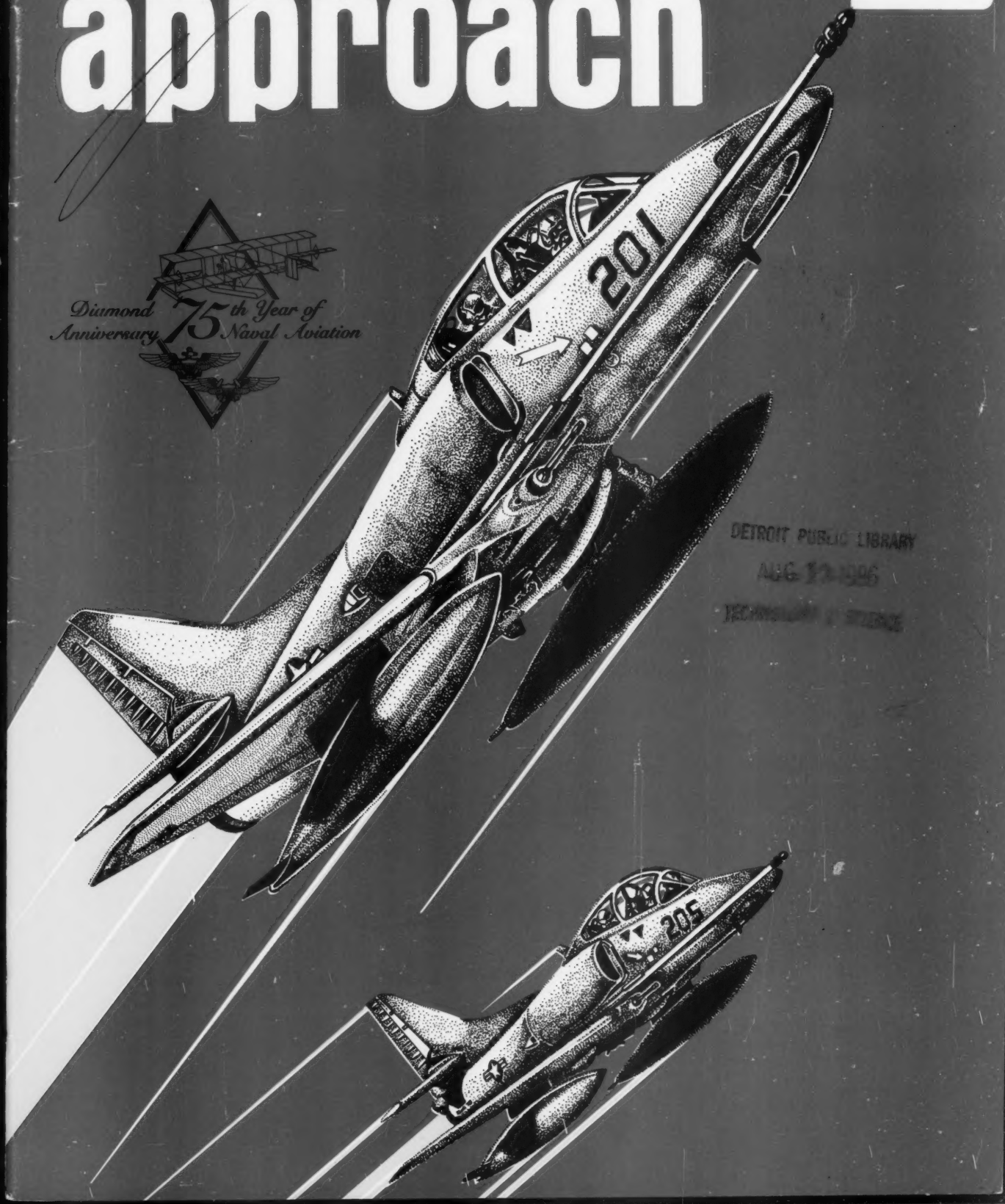

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TECHNOLOGY & SCIENCE

Lt. Jeff Blackburn of VF 102 shows how some might react to a safety lecture. He's not really sleeping. He's just posing. Actually he's wide awake and hearing every word.

Safety is Boring

Here I am, the brand new editor of Approach and already I have a problem. When I think of safety, I am nagged by memories of boring lectures that rarely addressed reality. I know that this is a common problem, but now (in this job) I can't afford to be dozing off whenever I hear the word "safety." I think I've figured it out.

During my last cruise I saw an EA-6B go in the water right off the cat. A scant few days later I saw an F-14 go over the side during a routine flight deck move. Within another month there was a ramp strike followed by a saltwater bath that wrote off another F-14. Being close to these accidents was anything but boring. It was horrible. Morale? Hah! No one knew what was going to happen next. It was as if we had been cursed. Bored? I was shocked! Numbed to the bone!

Now I realize that those accidents are what aviation safety is all about: saving lives and airplanes. Safety lectures can be boring but the lack of some kind of effort creates the kind of excitement I can live without.

Bridging the gap is what Approach is all about. Let me know if we're boring you.

Lt. Dave Parsons

inside approach

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Vol. 32 No. 1

Cover drawing of a TA-4J Skyhawk by Approach illustrator John W. Williams.

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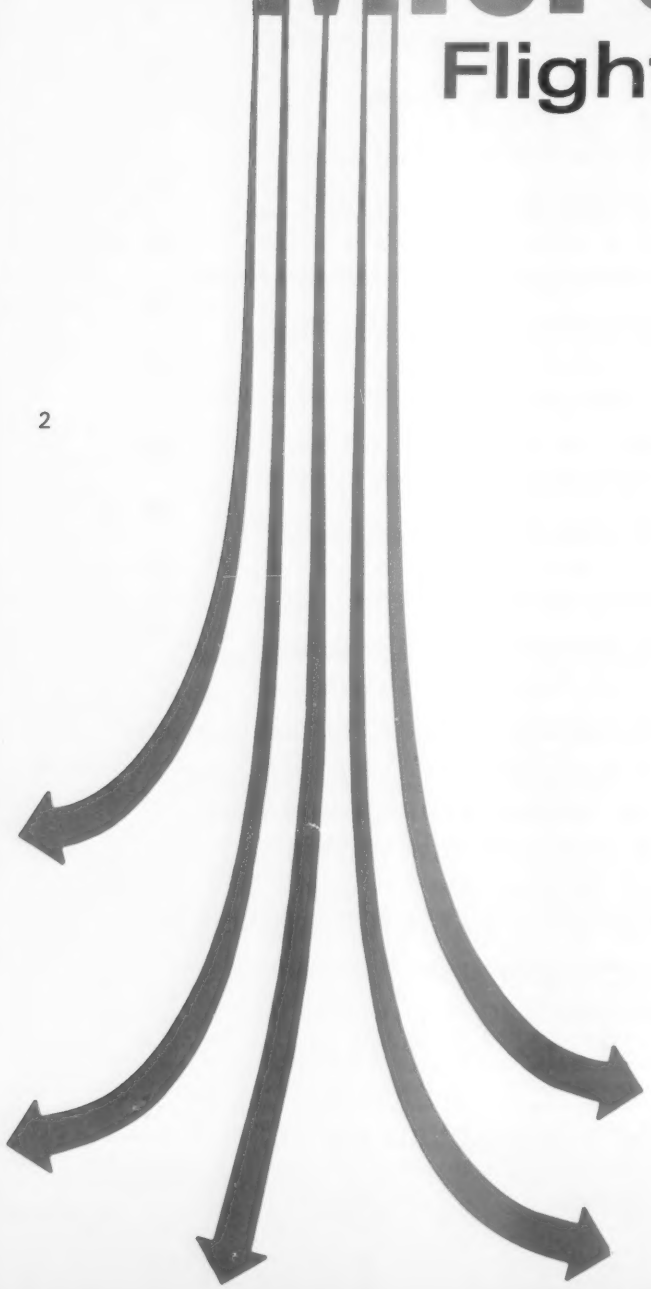
Against All Odds

Microburst Flight Survival

By LCdr. Joseph F. Towers



"Watch your speed.
"You're gonna lose it all of a sudden, there it is.
"Push it up, push it way up . . ."

In some ways the storm looked like a typical rain shower under a 6,000-foot cloud base. Those who were fortunate enough to fly through it said it was like hitting a wall of water with near zero visibility. As for the others, it was a nightmare they would never live to tell.

Flight No. 191 slammed into a field while on final approach to 17L at the Dallas/Fort Worth International Airport (Figure 1). As the aircraft slid across Highway 114, the left engine separated after colliding with an auto. The massive L-1011 then yawed left and hit a water tower left of the extended runway centerline. The mangled metal and post-impact fire killed 135 people. During the approach, the aircraft had penetrated a powerful microburst-induced windshear spawned by a fast-building convective storm. In five seconds the head wind increased from 10 knots to 27 knots. Vertical winds of +1,500 fpm to -3,000 fpm followed. The powerful L-1011 was in a severe downflow for 20 seconds. Tail wind velocities reached approximately 40 knots.

At about 600 feet the aircraft was above glide slope with a 13-degree deck angle and airspeed slightly below the reference speed of 137 KIAS. Within five seconds, the deck angle went to -8 degrees as reference speed was attained along with a descent rate in excess of 3,000 fpm. The steep descent angle continued until impact. Indicated airspeed at this time was approximately 169 knots.

Reports provided by NASA Ames indicate that this microburst contained a complex series of multiple vortices, rapid wind reversals and intense updrafts and downdrafts within the main structure. This information leads us to believe that a microburst may be far more complex and dangerous than earlier investigations revealed.

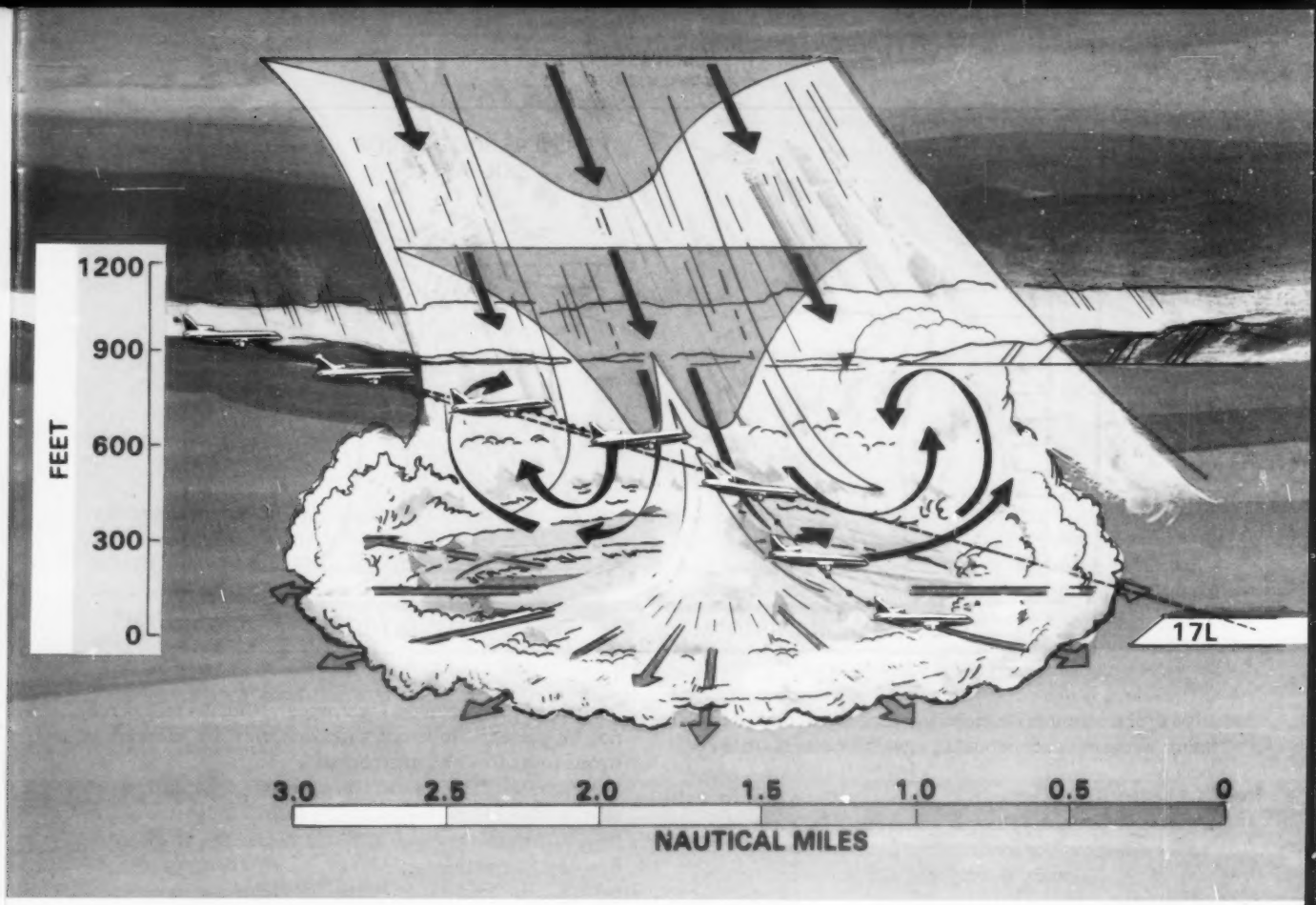


Figure 1

A microburst, the smallest and most lethal of the downburst family, is an intense, highly localized downward atmospheric flow. It is classically spawned by convective parent clouds and occupies a small geographical area with a life span of only a few minutes.

Figure 2* shows the vertical cross section and dimensions of microburst winds. A macroburst, with its similar wind, is a larger downburst with horizontal dimensions in excess of 4 kilometers or 2.5 miles.

During its descent, a microburst is about 1 kilometer wide. As it approaches the earth's surface, it diverges horizontally in an asymmetric pattern of violent, powerful wind radiating out to 4 kilometers in diameter and upward to approximately 1,000 feet in height.

After the diverging flow first hits the earth's surface, a doubling of the intensity to a maximum occurs within five minutes. This maximum intensity may then be sustained for up to five minutes before dissipating. During this time, should a microburst be accidentally encountered and successfully negotiated, there exists no assurance that the next aircraft will be able to safely traverse it.

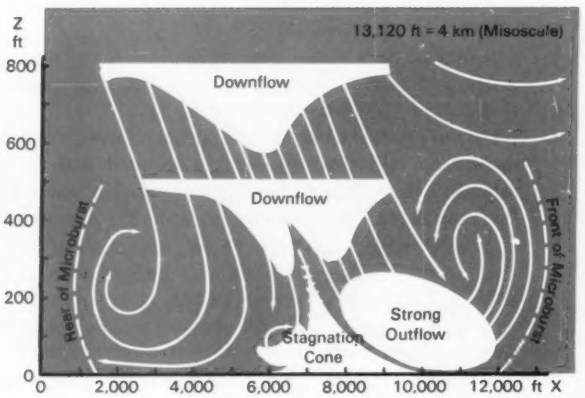


Figure 2

*Figures 2 and 3, courtesy of Dr. T. Theodore Fujita, Department of the Geophysical Sciences, University of Chicago.

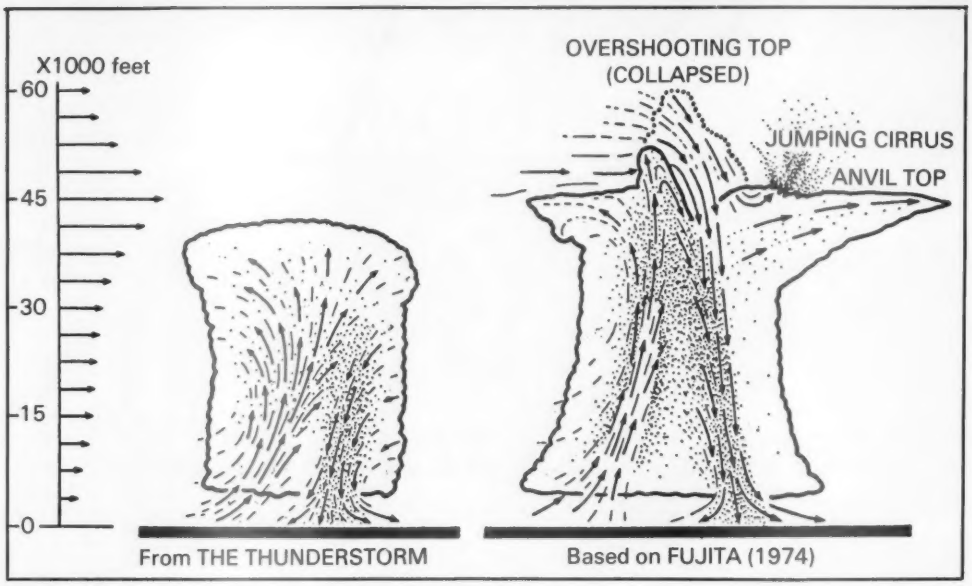


Figure 3

Microbursts often develop in groups or families of two or more, so the presence of one is a signal that others are likely to occur.

The two basic types of microbursts, wet and dry, are both relatively common. The wet microburst is associated with heavy rainfall at the surface. This type may be present when any of the following conditions exist beneath a convective cloud base:

- torrential rain
- isolated rain shower
- defined rain shaft
- wall of frontal rain
- horizontal vortex ring
- variable, gusty winds

It may be possible for a wet microburst to be obscured in instrument meteorological conditions, making visual detection during flight nearly impossible.

Do not attempt a takeoff or approach through an isolated shower or rain shaft which is associated with torrential rainfall. A low altitude windshear condition could develop that may exceed the aerodynamic capability of your aircraft.

The other type, a dry microburst, may contain little or no rain at the surface. It is often associated with innocent-looking virga beneath a high altitude convective cloud base and usually develops in dry climates such as those of the Western United States.

Figure 3* is a classical illustration of the intense updrafts and downdrafts associated with thunderstorms. Dr. Fujita postulates that when an overshooting top rises and then collapses rapidly, a microburst can form on the downwind side of the dome. The downdraft may be fed by fast moving stratospheric air above the anvil as the overshooting top collapses. Microbursts may also be induced by isolated showers from relatively small, rapidly expanding but relatively short-lived parent clouds. Lightning and thunder may or may not be present. Supercell thunderstorms are inducers of strong tornadoes and microbursts.

Virga is an often-beautiful phenomenon resulting from the evaporation of precipitation as it falls through the atmosphere. During the evaporation process, the already cold downdraft is further cooled, increasing its density and accelerating it further. Investigation indicates that some microbursts may be induced solely by this type of evaporative cooling of raindrops under certain atmospheric conditions.

The downflow of a dry microburst may be nearly impossible to see. However, the presence of any of the following phenomena could indicate the presence of a potentially dangerous condition:

- precipitation shaft aloft
- virga beneath cloud base
- variable, gusty winds
- localized blowing dust rings

Low altitude windshear alert systems currently installed at some major U.S. airports cannot be entirely relied upon to detect microbursts, since some are small enough to pass between the present sensor spacing. It is imperative that the flight crew use all available information when making a determination whether or not to proceed under possible hazardous conditions.

Windshear can be associated with frontal activity, strong surface winds, low altitude jet streams, temperature inversions, sea breeze fronts and unique topographical conditions. However, thunderstorms and intense convective activity present the greatest danger.

Microburst Flight

How does a microburst affect an aircraft during flight? Figure 4 depicts the four forces of acceleration acting on an aircraft in flight. During microburst penetration, these forces

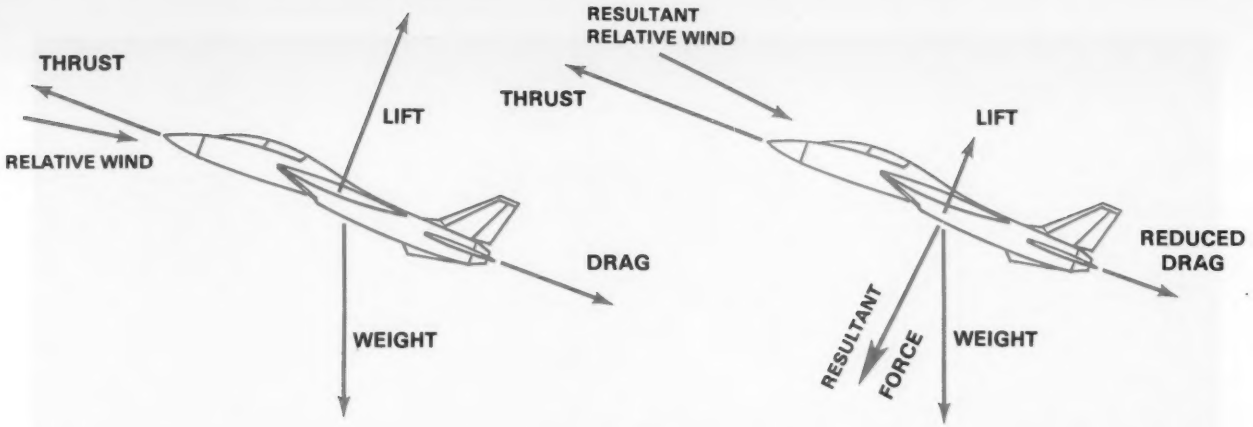


Figure 4

can become unfavorably unbalanced due to a brief reduction in lift produced by a shift in the relative wind and a reduction in airstream velocity. The result is an altered flight profile as the aircraft seeks a condition of equilibrium.

Figure 5** illustrates how the flight path can change during microburst flight along with the aircraft's anticipated changes in pitching moment. It assumes a constant thrust setting, an initially trimmed condition and no control inputs. Initial penetration will typically result in increases in indicated airspeed and an increasing or erratic angle-of-attack. The result is an upward pitching moment and an **increasing performance profile**. As the aircraft then penetrates the downflow and tail wind areas, critical losses of indicated airspeed and angle-of-attack will occur. These combined reductions will impair the aircraft's ability to generate lift. This results in a downward pitching moment and a **decreasing performance profile**. If the aircraft is not developing sufficient lift to support its weight, the resultant vector (of lift, weight, thrust and drag) will create

**Figure 5 developed by LCdr. Towers and produced by FASOTRAGRUPAC Media Services.

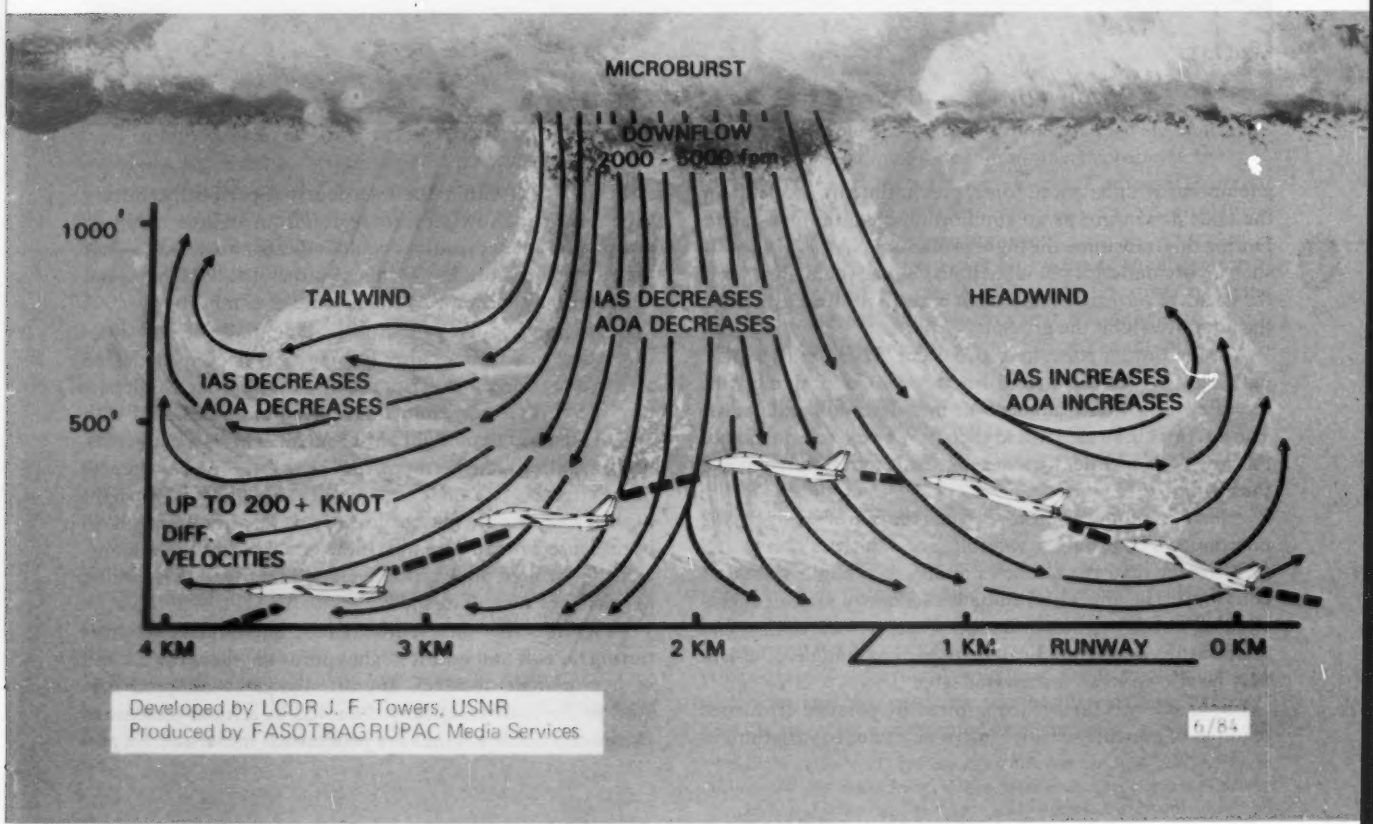


Figure 5

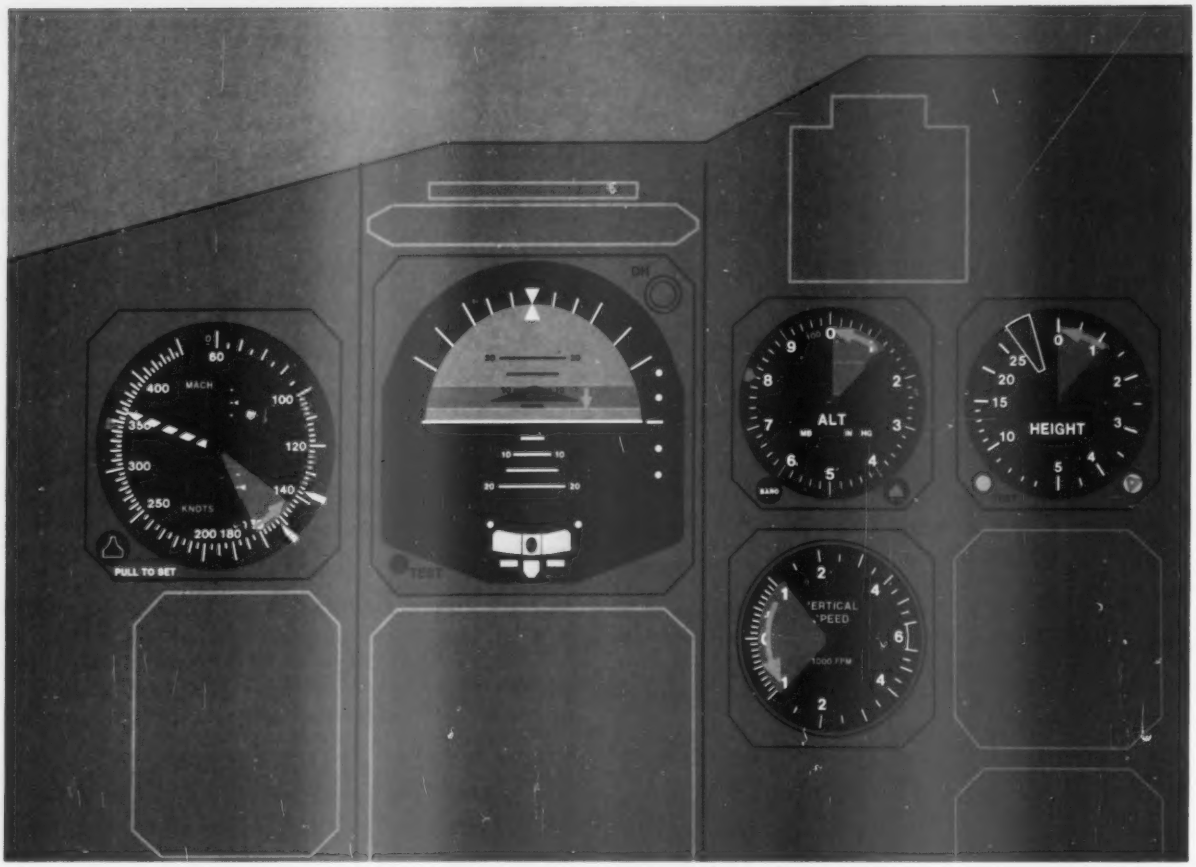


Figure 6

a temporarily unbalanced force, gravitationally accelerating the craft downward as an equilibrium condition is sought. During this transition, the flight profile is adversely altered. If such an oscillation is not interrupted by the flight crew, or if the negative vertical displacement exceeds altitude available, the aircraft will hit the ground.

A second-order effect may also occur. The aircraft's flight path may be further altered because it is now flying with increased downward momentum in a descending air mass. The aircraft climb rate would then have to exceed the rate of the downflow in order for a net climb rate to result, relative to the terrain.

A further complication arises when the rate of change in the microburst's continuous, variable gust velocities occurs at a rate greater than the aircraft's ability to attain a stabilized condition. The aircraft's resultant oscillatory motion aggravates an already critical situation. Furthermore, the normal relationship between indicated airspeed and angle-of-attack may be altered to an unknown degree.

Flight safety is further jeopardized by possible erroneous readings of pressure sensitive instruments due to variations in static pressure within the microburst. Specifically, during penetration of a low pressure region from an area of higher pressure, altimeter readings could indicate an altitude higher than the true altitude — and a barometric vertical speed indicator may show an erroneous rate of climb.

During microburst conditions, a potentially deadly situation exists in which an aircraft may be robbed of indicated airspeed to the point where it is below the approach or departure speed. **Typically, pilots have been more obsessed with loss of airspeed than flight path control. This is a dangerous preoccupation**. Furthermore, they have little or no awareness of the effects of a dramatic change in angle-of-attack. In light of this, it is possible that the loss of several aircraft may have been caused by an attempt, either consciously or unconsciously, through pitch attitude reduction, to attain a specific approach or takeoff airspeed.

Now, let's envision a representative microburst encounter during takeoff and how it might appear to you in the cockpit of a non-angle-of-attack aircraft. Indicated airspeed may start to fluctuate erratically, followed by a rapid increase as the frontal outflow winds are penetrated. Initial aircraft per-

formance will improve substantially. Upon penetrating the downdraft, indicated airspeed decays rapidly, followed by a decreasing vertical speed trend on the vertical speed indicator (VSI), altimeter and radar altimeter, and a reduction in pitch attitude.

Figure 6** shows the primary indications of a deteriorating flight path condition. Do not reduce pitch attitude in an attempt to recover indicated airspeed since this can result in a further reduction in angle-of-attack, a high rate of descent, altitude loss and even ground impact. Instead, use all available excess thrust to accelerate the aircraft. Remember that flight path control is crucial and that airspeed, so long as it is above stall speed, should be a secondary consideration. The pitch down tendency of the aircraft, if not immediately countered by the flight crew, can lead to a rapid degradation in the vertical flight path and possible impact.

Should a suspected severe microburst be encountered, you should rotate to takeoff attitude and simultaneously advance the thrust levers to the mechanical stops regardless of engine limitations.

Pitch attitude should be increased to attain a greater angle-of-attack and lift coefficient. Rotation, even with indicated airspeed below normal, is a counter-intuitive, yet crucial response. **Primary attention should be devoted to attaining a positive, climbout pitch attitude**.

Be aware that substantially greater control column forces will be required as the aircraft becomes more out of trim. Twenty to 30 pounds of back pressure, roughly equivalent to initial rotation, is common and should be expected.

If necessary, use intermittent stick shaker as the upper pitch attitude limit. Remember, this is a recovery technique to be used in an extremely critical situation to achieve a kinetic energy exchange for a short term performance gain to reduce the possibility of a crash. This technique applies to non-angle-of-attack aircraft during both takeoff and go-around and is given with this warning:

Stall warning systems are not precise flight instruments. Unnecessary overrotation to stick shaker can place the aircraft dangerously close to stall. Rotate only enough to establish a positive climb. Continued rotation to stick shaker should only be attempted if ground impact appears inevitable.

When verifying a positive climb rate on the vertical speed indicator, be aware that this pressure instrument may be erroneous because of lag and variations in atmospheric pressure within the microburst. Always cross-reference the radar altimeter.

If your aircraft has a flight director, disregard pitch command inputs since the "V" bars will command pitch attitude reductions during low-speed maneuvering to attain V(ref) or V_2 and can artificially inhibit deck angles when a higher pitch attitude may be required.

Now, let's take a look at an angle-of-attack aircraft during the approach. As the outflow is penetrated, warning signs may include an erratic or increasing angle-of-attack, a rapid climb in indicated airspeed, a reduction in descent rate and a ballooning float to above the glide slope. The reduction of thrust and pitch attitude to correct back to the glide slope is a typical but deadly mistake. **Expect trouble in this situation and immediately execute a go-around.**

Should a suspected severe microburst be encountered, **rotate to go-around attitude**, and simultaneously **apply maximum thrust**, including the selection of afterburner.

If a descent rate exists below 500 feet, **continue rotation**, referencing angle-of-attack, to attain a positive climb rate.

If a positive climb rate cannot be initially achieved or sustained, attempt to fly out in no less than a level flight condition. Once downward acceleration has developed, it requires an aggressive and extraordinary force to overcome; one which may be nearly impossible for an energy deficient aircraft to generate, especially when given very limited time and altitude constraints.

There is no guarantee for success with these techniques since the physical forces of the given shear or microburst may easily exceed the aerodynamic capability of any given aircraft. These techniques are designed to optimize flight path direction, using existing instrumentation, during a critical phase of flight when ground impact is a distinct probability. Always delay the takeoff or approach if any reason exists that a potentially dangerous condition may be present.

For all aircraft, impending recovery should be indicated by increasing trends in the following flight instruments: vertical speed indicator, radar altimeter, altimeter and indicated airspeed. This equates to an increasing performance profile that should be anticipated as the microburst is exited.

Faster approach and departure speeds provide additional performance potential for coping with a microburst, but they do not in themselves guarantee success. Coordinated execution of pitch attitude and thrust management to control flight path direction are far more important.

Remember that since power plus attitude equals performance, it is crucial to rotate while simultaneously applying maximum thrust. This maneuver is the most expeditious means to compensate for loss of lift and to establish a new flight path.

A major problem with microburst conditions is the fact that because the relative wind is changing so dramatically in both velocity and direction, it may easily exceed the pilot's or aircraft's ability to safely negotiate it. The aircraft may not be able to accelerate enough to compensate for the rate of change of the relative wind.

The microburst is a powerful atmospheric disturbance that poses an indisputable danger to all aircraft. During your flying career, you may encounter one or more microbursts. The outcome will depend on the intensity of the microburst, your aircraft's vulnerability and your ability to control flight path direction. You may have less than five seconds to recognize the situation and respond accordingly. ◄

**Figure 6 courtesy of Boeing Airplane Co.

LCdr. Towers is a San Diego-based first officer on the B-767 with American Airlines. He has studied and written extensively on the phenomenon of microburst-induced windshear for the last five years. A reserve naval aviator, he is an instructor pilot in the C-9 with VR 57 at NAS North Island, Calif.

Hazardous Cargo and the 505. The VA squadron had recently returned from an extended deployment. Trying to ship hazardous materials back via a VR squadron, the Corsair folks asked what was transportable. The VR squadron said several items could be shipped but *only if they were in their original unopened containers.* The NAS supply and shipping office also said that with proper shipping labels, the items should present no problems.

The VA squadron safety petty officer talked to a loadmaster from the VR squadron who again confirmed shipment of the material was legal and presented no obstacles if packed in the original containers.

Prior to delivery to the terminal, personnel from the attack squadron made a final check of the materials, removing several cans that were not ready for transport. The airlift officer signed the safe-for-flight certification form. Nevertheless, when the VR aircrew inspected the pallets, they found items that they had to remove, including all liquids, gels and aerosols.

The lack of training of squadron personnel in handling hazardous cargo, the incomplete training of VR loadmasters and terminal cargo personnel and the difficulty in using NAVSUPPUB 505, which is not user-friendly, caused problems for the returning squadron.

And From the Other Side of the House. One big problem is training. Each squadron is required by instruction to have a qualified certifier for shipping hazardous materials. Training is required for personnel who perform loading or handling duties. This means the people who pack up your pallets. Who packs up your pallets? I'll bet it's the most junior, least experienced personnel you have. I wonder if ADAA Jones knows that naphtha, which was manufactured and packaged at sea level at 14.7 psi., will try to escape from its container in a C-9 pressurized at 8.0 psi. I wonder if he knows it's forbidden on passenger-carrying aircraft. ADAA Jones uses naphtha often in his daily tasks. Has he ever heard of hazardous cargo? Do *you* know what's in your cruise boxes? Who is responsible for ADAA Jones's training and supervision? Where is your leadership?

All C-9 loadmasters are now required to have hazardous material training. I instruct it here and at the squadron level. I teach my crew members to be skeptical; trust no one and cut locks or refuse cargo if it's not properly packed and certified IAW. NAVSUPPUB-505. I tell them that they are the only enforcement we have. Taking a hard line seems to be the best prevention.

We want to support you and give you the best service possible, but your cooperation and *leadership* is needed to do it safely. The Joint Military Packaging Training Center, Aberdeen Proving Ground, Md., has a kit PN JMPTC-5 for training other than certifying officials. It's free, and comes with all the necessary instructional materials, films, booklets and lesson guides to conduct a class. It is available by phoning Autovon 298-5185 or writing:

Director
Joint Military Packaging Training Center
Attention: DRXPT-A
Aberdeen Proving Ground, MD 21005

Submitted by
AMH2 Timothy G. Robinson
Instructor, Navy Loadmaster School

The VR community has proposed a packup checklist, not yet approved, which should ease the trauma inherent in unfamiliar flyaway packups. The checklist still requires the shipper and squadron involved to abide by the 505, but offers guidance in its use. This may seem like a "quicky" cure for the difficulty in using the 505, but until that manual is rewritten and organized for easy application, the

AIR BREAKS

proposed checklist should help avoid shipping abuses. For more on hazardous cargo, see "Cargo Care Is Critical," Approach, May 1985, and "Just What Am I Carrying?" Approach, March 1986. — Ed.

Student Hypoxia. The student NFO strapped himself into the T-34C for his first training flight. It was a familiarization flight, intended merely to introduce the student to the aircraft and flying in general. After takeoff, the instructor pilot (IP) heard the student's breathing increase through the hot mike. The IP told the student to relax and count backwards from 10. The student's respiration rate returned to normal.

Fifteen minutes later, the IP again heard the heavy breathing behind him. He told the student to simply relax and watch and enjoy the flight as the IP demonstrated various maneuvers. Although the student's breathing again slowed, he now became airsick. He appeared listless and couldn't sit upright. The IP's repeated calls to count to 10 drew a weak response. Finally the student reported that his hands and feet were tingling. The IP correctly concluded the student was hypoxic due to repeated hyperventilation and put the student on 100 percent oxygen.

The IP aborted the flight and returned to base, notifying the squadron to have an ambulance ready. After landing, the student was put under observation and grounded for three days. A subsequent flight did not produce the same symptoms.

The fairly relaxed atmosphere of the first-time flight is still no place for the relaxation of normal in-flight safety. Fortunately for this student, the instructor understood this and placed the ICS on hot mike. The IP also knew how to counter the initial onset of the problem with calm, knowledgeable advice. And when the student's discomfort became more severe, the IP knew when enough was enough. The CO's comments agree.

"Bravo Zulu to the instructor who recognized the hazard . . . took positive action . . . then treated it (the student's hyperventilation) immediately." — Ed.

The Crowded Sky. During a night Case One EMCON recovery, an E-2 on final approach was underflown by an A-7 *flying the same ball!* There was no visible horizon that night, and the pattern was stretched out six to seven miles downwind due to sheer numbers of aircraft. The A-7 last had a tally on the E-2 when the Corsair pilot turned in after taking interval, but apparently lost sight of the Hummer while maneuvering for the approach.

The approach speed differential, coupled with the long straight-in, was enough to simultaneously put both aircraft at the same starting point. Fortunately, the E-2 was high enough that the LSOs (God bless 'em) called, "On the ball, you're high."

The Hummer pilot finessed it down and replied, "Ball."

The startled A-7 driver executed an immediate left turn and departed the pattern.

The CO of the E-2 squadron said it well: "A basic aviation tenet is a vigilant lookout. This tenet is the difference between a successful tactical recovery and a midair collision on the ball."

When You're Hot, You're Hot. When You're Not, You Still Might Be Dehydrated. The student pilot departed the squadron in the early afternoon for the scheduled training flight. During engine start, one generator would not come on the line. Maintenance tried unsuccessfully to fix the problem. The aircraft was downed and a spare assigned.

For 95 minutes, the student pilot remained on the flight line awaiting the spare aircraft. Takeoff and departure were normal, and a descent into the MOA was initiated to set up for a lazy eight. Passing 16,000 feet the student began to feel confused and disoriented. He selected 100 percent oxygen and descended below 10,000 feet. He advised approach control to change to the local channel for emergencies and to have the squadron come up on frequency. As the squadron was tuning in the frequency, the student pilot asked approach for vectors to base for a straight-in approach. The squadron advised him to return to the area and wait for a chase aircraft.

After join-up, it was determined that the student was able to recover the aircraft, and the flight was vectored for a straight-in approach for a full-stop landing. The approach was broken off due to the student pilot being high and fast on final. The chase aircraft directed a left climbing turn to set up for another straight-in. During this turn chase had to make repeated radio calls for the student pilot to climb to a safe pattern altitude. A long final was established and the aircraft descended for landing. The approach was slightly fast, and on landing rollout the runway duty officer directed the student pilot to aerobrake. The aircraft was stopped and the student pilot was met by the flight surgeon.

Examination revealed that the student pilot was extremely dehydrated. The 72-hour history showed no previous lack of sleep or nutrition; however, there was a lack of fluid intake during the day of the incident. This lack of fluids combined with the long exposure to the hot temperatures resulted in dehydration.

Lesson: This incident occurred at a base in the southwestern United States in *February*, not in the summertime . . . and summertime is here.

Submitted by LCdr. D.D. Barclay.

Fleet Lieutenants

By Lt. Terry D. Craig

. . . As the pilot at the controls set the parking brake, a combination of inappropriate pedal force, a tail wheel that did not lock and a case of unquestioned complacency caused the helicopter to do a "precision" ground loop faster than you could say "fleet lieutenant". . .

FLEET lieutenants — I will always remember the skipper's fleet lieutenant speech as he pinned railroad tracks on seven "seasoned" first-tour fleet aviators. "Fleet lieutenants have all the answers, possess immense knowledge of the aircraft and tactics, get all the good flight time — nights, IFR — and the only thing a fleet lieutenant knows better than NATOPS is the O-3 pay scale."

And yes, that's what we were, fleet lieutenants. The eager aces of the bases. Fly us at night; the pitch and roll will get better by recovery time.

So one year later, we returned to the home guard squadron after a seven-month deployment. This time out as aircraft commanders, we made the decisions, we kept the missions safe. Complacency? Not even in our vocabulary. Safety conscious? You bet. We've made it this far. We're careful out there. Confident? Night IFR recovery to the pitching back of an FF? So what's for midrats?

Well, here we are now, back at the homeguard squadron, a thousand hours in model, aircraft commander, functional check pilot and fleet lieutenant.

Then we get a weekend cross-country, VFR all the way. The flight crew is familiar. So is the brief. I begin as always by asking "What's the primary mission of this flight?" The crewman answers in a robotic voice, "To get the aircraft and aircrew back on the ground safely, sir." Maybe everything is too familiar.

We have the standard non-operational brief: no ASW, no air intelligence, no SAR. The flight is a day VFR cross-country with a fuel stop at East Coast AFB where we will have to shut down for fuel. All we have to do is stay awake and add 0+45 to the proposed off time on the DD-175. B-O-R-I-N-G.

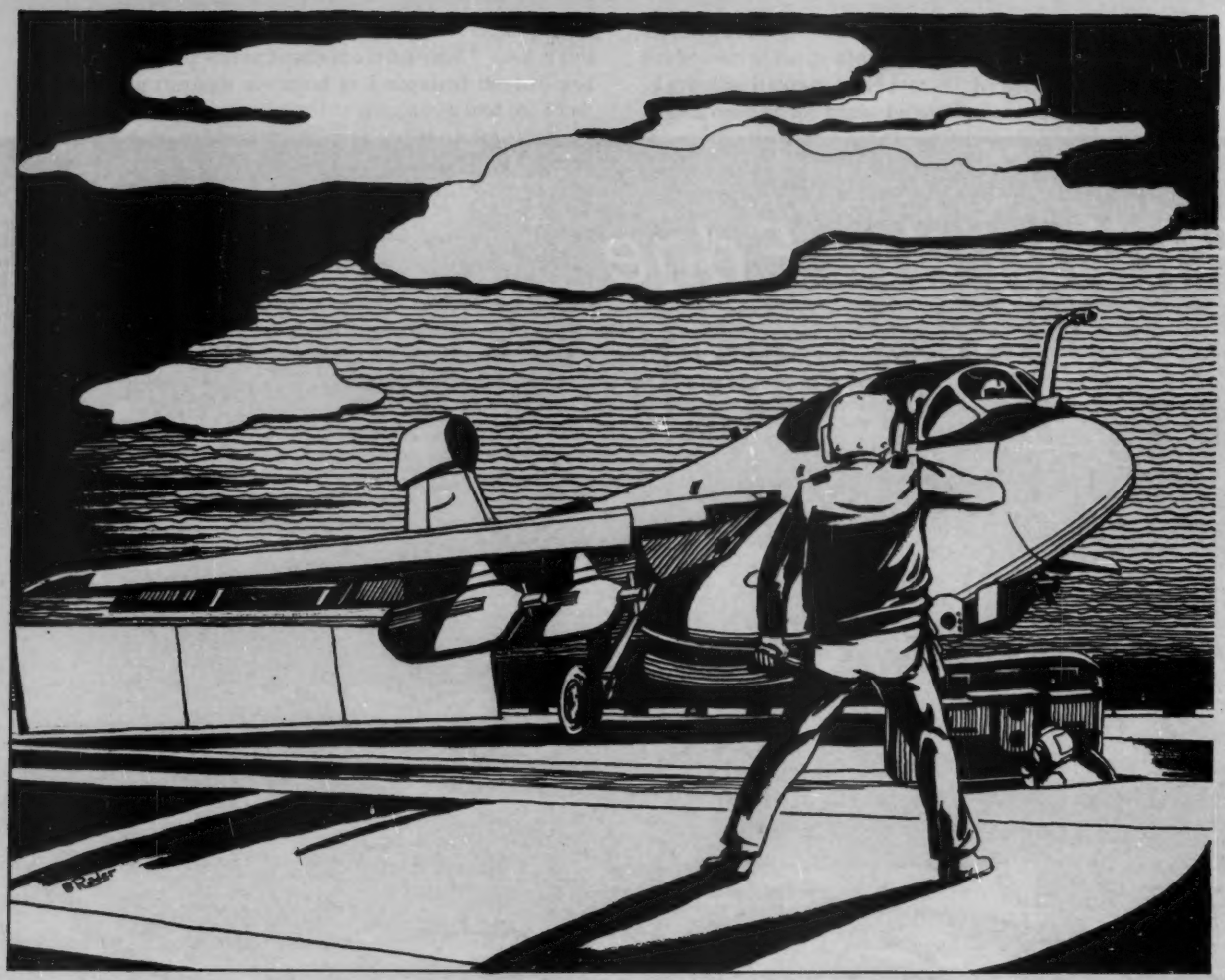
We approach the AFB and complete the landing checklist. Sure, we'll take a visual approach. Been in here a dozen times; nothing compared to navigating to spot 3 on a packed CV. "Tower, Three Five is clear of the duty, follow me truck in sight." "I'll look over the aircraft, you coordinate the box lunches. Shutdown checklist, brakes, pins, 180-degree ground loop. Hey, what's this? We just got an unintentional panorama of East Coast AFB.

As the pilot at the controls set the parking brake, a combination of inappropriate pedal force, a tail wheel that didn't lock and a case of unquestioned complacency caused the helicopter to do a "precision" ground loop faster than you could say "fleet lieutenant."

Had this incident occurred during a "hot pump," most definitely a fuel rig and possibly one helicopter would have been destroyed. It also might have killed or injured the aircrew and the often-overlooked heroes of the fuel pit who trust the pilots to control these "whirling pieces of rotor blades" while they're getting filled with JP-5.

This time, no one gets hurt; no runs, no hits, one error, two red-faced "experienced" fleet lieutenants left on base. Complacency? I thought that only happened to lieutenant commanders. ◄

Lt. Craig flies SH-2Fs with HSL 30, NAS Norfolk, Va.



Aborted Takeoff?

By LCdr. Buster Holk

OUR trusty Prowler was spotted on cat 4 as we awaited another night launch. The launch began and the director ordered "take tension." I advanced the throttles, raised the cat grip and as I glanced outside, saw the aircraft was moving forward! Instinctively I jumped on the brakes. It's been ingrained in me to never pull back the throttles until the cat officer steps in front of the wing so I delayed for about a second before deciding I **really did** want to pull them back. Finally, as the aircraft stopped, my eyes focused on the cat officer frantically signalling me to throttle back.

This was a relatively minor incident, but the potential for disaster was certainly there. As the aircraft was put in tension, the holdback fitting slipped out of the trail bar, allowing the aircraft to begin rolling forward. We stopped within 15 feet after leaving some nice skid marks.

The weather was good and the bright flight deck lighting gave me good visual cues. Had this launch been under darken ship conditions, with a slick flight deck and the engines already spooled up to military, I wonder if I could have stopped on the flight deck had the holdback failed.

We always brief takeoff emergencies but aboard ship an "aborted takeoff" is seldom considered. It is important that all our critical flight phases be thoroughly thought out and that we know beforehand what we plan to do when something doesn't go right. Since NATOPS can't cover every possibility, those ready room games of "what if" pay invaluable benefits.

LCdr. Holk flies with Tactical Electronic Warfare Squadron VAQ 135.

Riding the Edge in a Skyhawk

By 1st Lt. J.S. Murphy, USMC

IT was a beautiful day in the Southwest desert. My flight of four Skyhawks had just completed a raked range bomb sortie, and we were headed back toward MCAS Desert. I stretched out my legs in the cockpit and reached for my water bottle as I hung loosely to the outside of my section lead. I flew almost subconsciously as I watched the desert beneath us. It had been a most successful hop.

Dash two had a hung Mk-76, so we began peeling off for individual straight-ins. I dropped the gear and went through the landing checklist, noting the tower had called the winds about 30 degrees off the runway, at 10 knots. I held my altitude as I watched the division lead, dash two, and dash three head toward the runway. Lead landed on the downwind side of the runway as he had briefed. Dash two and three landed and began rolling out normally. I was a bit leery of the landing and rollout since I had landed in a stiff crosswind the week before and rolled about 40 feet downwind of centerline before getting the Skyhawk tracking straight down the run-

way. I remember thinking, "Those guys weren't kidding when they said this thing was squirrely in a crosswind." All of this was running through my mind as I acquired the ball and prepared to land. I had a lot of left wing down into the wind, and some right rudder straightening out my nose along the runway. I felt the bird touch down normally, then a little lifting of the left wing as I began rolling out. I pulled the power to idle, checked the spoilers and jammed the stick into the left forward corner of the cockpit, telling myself that I wouldn't let the wind get the best of me this time.

I had rolled about 1,500 feet, when suddenly the nose whipped right, angling about 30 degrees off the downwind edge of the runway. I felt panic rising as I stomped on the left brake and jammed the stick even farther left. I remember thinking that the wind must be stronger than reported.

Left brake and rudder had no effect at all on my direction. The aircraft was slowing, but not quickly enough to stop before departing the side of the runway. I fumbled for the nosewheel steering button, remembering NATOPS said to use it for directional control as a last resort. The aircraft swung left and ground to a stop at the 8 board, on an 11,000-foot runway! I had landed and come to a complete stop in 3,000 feet.

Being inexperienced, I still thought that the crosswind was the culprit here. I advanced the throttle, preparing to taxi back to the line and ask tower what in the world the winds were. My division lead came anxiously over the radio, "Smurf, did you go off of the runway?" "No," I replied, trying to catch my breath, "I kept it on."

As I pumped the brakes firm, I felt the right one go all the way to the floor. I remember wondering how I could have lost a brake, still having no idea what had really happened to the bird.

"Tower, I've lost my right brake and am shutting down on the runway," I reported. I shut the aircraft down and safed the seat before jumping out. The crash crew had still not arrived, apparently not being aware of my predicament yet. As I jumped down to the asphalt, I couldn't believe my eyes. Hydraulic fluid was all over the runway underneath what was left of the right tire. On landing rollout the brake had locked; I couldn't imagine why at that point. In trying to stop the aircraft, I had ground the right tire down completely into the brake disc, so the disc looked like an inverted U. In the course of grinding it down, I had torn off the hydraulic fitting to the brake, causing the brake failure and loss of hydraulic fluid. About this time the crash crew arrived, shaking their heads at the sight of my aircraft. For some reason I got the silly idea of stepping off how far it was to the edge of the runway. It was 20 feet. As it turned out, my use of nosewheel steering had kept the aircraft from departing the runway. I glanced back up the runway, and clearly saw tire marks, leading to where the aircraft stopped. Although my left tire had not blown, I had left most of its rubber back on the runway in my attempt to get the aircraft slow and straight.

In my desire to defeat the crosswind, I not only had right rudder in, but also right brake in! When I touched down, the brake locked, causing the short and distorted rollout. I couldn't help wondering what would have happened if I had been dash three and landed on the downwind side of the runway. It certainly would have ruined my day.

During the entire landing sequence, I never thought about ejection. This is probably because I felt all along that I was just battling a crosswind. Fortunately, the worst thing that happened was that I ruined two tires and a brake assembly. The aircraft was up and flying two hours after being towed from the runway.

I learned two things from that landing other than the obvious, "Keep your heels on the deck." The first is never take landings lightly. Every landing I had made up to that point — probably over 100 full stop rollouts — had been normal. The last thing that I was expecting on that beautiful day was to go off the downwind side of the runway. Now, I expect the aircraft to depart the edge of the runway on every landing. I'll be ready when it does. The second lesson I learned is to remember where you are. In my desire to stop the aircraft, I just did not consider ejecting, although this was a definite situation where I might have, especially if I had been dash three.

In retrospect, I am glad I went through this incident. Now, every takeoff and landing pumps up my blood pressure, and the seat handle is an old friend just waiting to carry me to safety. I suppose that is how it should be. ◄

Lt. Murphy is an A-4 pilot with H&MS 13. A graduate of California State, he is the squadron's S-4 supply and logistics officer.

Helo Safety During UNREP

Our ship was UNREPing from a supply ship and was taking on JP-5 from the aft station. The decision was made by the bridge to conduct helo operations during the evolution.

The flight deck safety observer advised the LSE that it was unsafe because of the possibility of the fuel hose breaking while the helo was hovering above deck. If this were to happen, the vortex could draw atomized fuel into the exhaust path, causing a major mishap. A senior chief corpsman also went to the bridge to advise them of this possibility.

Unfortunately, the advice was not taken and flight operations commenced. We were down to the last priority bag of mail and the last pallet of retrograde, with 10 flight deck personnel on deck, including the LSE and safety observer, 12 fire party members and approximately 15 to 20 men manning the fueling detail when the fueling nozzle was disconnected.

JP-5 sprayed everywhere. I was at least 40 feet away and instantly covered from top to bottom with a kerosene mist. We were all lucky this time — no fire or explosion. I hope we can prevent things like this from happening in the future.

Playitsafemouse

While NWP-14C and NWP-42G do not restrict simultaneous VERTREP/CONREP operations, the hazards are known and need to be factored into the decision process. During rigging and unrigging of the refueling stations, the creation of FOD and a fuel spill are likely. Besides being messy, the fuel mist can detonate a jet engine if ingested in sufficient quantities.

Flight Deck Safety Problem

During Sunday morning VIP operations aboard USS boat moored in an overseas port, operations started off on the wrong foot. Flight ops had just been sounded when the ship's XO passed the word for the air department to suck water from the flight deck padeyes since VIPs were being flown. The air department commenced this evolution while the helo flight crew finished their

Let Anymouse Know. We encourage you to write Anymouse whenever you see "a mishap about to happen." If you know of a hair-raising situation in the air or on the deck, let Anymouse know about it. You may help someone else avoid an unsafe incident.

Anymouse is a unique department in Approach where no names are used. All information is anonymous. In fact, Anymouse was born three decades ago when someone couldn't spell "anonymous" and signed his letter "anymouse." Thus, a mouse wearing flight gear has become a worldwide naval aviation safety symbol.

Over the years we have found it is often more prudent and speedy to report unsafe situations anonymously. Keep in mind, though, that Anymouse is not interested in personality conflicts or non-constructive criticism of individuals. All views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

For your convenience, postpaid Anymouse mailing forms are available in most ready rooms and from most flight safety officers. Use of the form is not mandatory, though. Just jot down your thoughts and mail to Anymouse, Approach Magazine, Naval Safety Center, NAS Norfolk, VA 23511-5796.

preflight.

The flight deck safety petty officer notified the padeye suckers that the aircrew were ready to start No. 1 and they were cordially asked to pack up and leave. However, the air department chief wanted to accommodate the XO's order so he stayed to personally supervise in finishing the job while No. 1 engine was being started.

Once again the flight deck safety petty officer went back to the air department chief and told him he had to clear the flight deck because the flight crew was ready to start No. 2. His people needed to clear the flight deck ASAP because rotors would be engaging immediately after No. 2 engine was started. The chief hesitated but finally the flight deck was cleared of this obstacle. (Talk about an upset flight deck petty officer and flight crew.)

With the removal of these personnel, an amber deck was given and rotors engaged when suddenly a chock and chain runner spotted a lieutenant commander popping up out of the catwalk to take a shortcut instead of going down and under. The chock and chain runner had already asked this officer on numerous occasions to get back down and out of the catwalk but was ignored once again. It's a wonder that he still has a head on his shoulders because the droop stops were still down and in.

It was almost as if somebody was setting the stage for a blood-and-guts movie this Sunday morning. A tender was moored to our ship and personnel were continuing to stand on the bow and weather deck. In addition, personnel were crossing over the brow carrying loose and sundry objects that were dropped and blown around by rotor wash. With rotors still engaged, a captain and the same lieutenant commander came strolling back across the flight deck (with their covers on no less) and hopped into the catwalk, proceeding to the after brow to greet the VIPs.

Finally the area was clear once again, the VIPs were put on the aircraft, a green deck given and the LSE gave his signals once more without blood being spilled on the flight deck. The big thing here is we, the flight deck crew, are trying to be professional but our best efforts are being overriden by senior personnel whenever VIP operations are conducted.

Clearthedeckmouse

They were attempting to conduct flight operations before they were ready. This points out a need for constant and direct communications among squadron COs, Det OICs and the ship's skipper to get order on the flight deck.

Work Force Too Thin

My squadron's hydraulic shop has a table of organization (TO) of 13 personnel, but due to shortages only six are on the job. Between details and detachments, only three are working regularly in the shop, including the shop NCOIC (non-commissioned officer in charge).

Since the squadron has more than a dozen aircraft, these men are working constantly. If this pace continues indefinitely, it could possibly contribute to a serious aircraft mishap. This could be prevented by bringing the shop TO up with both experienced as well as untrained personnel.

Wornoutmouse

Lapse of Memory Hazard

After finishing the last engagement of my second ACM hop of the day, my wingman and I were headed back to NAS Southernmost. My radio was intermittent, so my wingman was handling a good portion of the comm.

My TA-4J was level at 16,000 feet about 37 miles out when the fuel gauge dropped to 550 pounds. A steady low fuel light caught my full attention. Seeing the classic symptoms of a fuel transfer pump failure, I selected emergency transfer and commenced an idle descent to home plate. I asked my wingman to declare an emergency for me and to pass my intentions on to tower for a straight-in to the duty runway.

Everything was looking all right but I had a nagging feeling I had forgotten something. Landing and rollout were uneventful. However, the fuselage tank had never received fuel from the pressurized wing, and I landed with approximately 450 pounds indicated on the gauge.

As I was unstrapping and getting down from the wing, I finally remembered what I forgot: to pressurize my drop-tank. Sure enough, the drop-tank was full, the wing empty and the fuselage tank had a meager 450 pounds of gas remaining. If this emergency had occurred a little farther out, the results would have been catastrophic.

What caused this Delta Sierra? A couple of things. I had problems communicating my intentions, which distracted me from the duties at hand. Furthermore, the last time I had a similar problem I was not carrying a drop-tank, and did not need to select "drop-tank pressurization." Finally, my wingman and I didn't use the PCL to ensure compliance with NATOPS.

For my actions I was awarded a two-day rest from the flight schedule, which I feel I richly deserved. Don't be lulled into a false sense of security because of procedures that worked before. Break out the book and be sure that what you're doing is correct.

Bythebookmouse

This pilot knows he was lucky to walk away from this one. Preoccupation led to inattention to basic NATOPS procedures. Had the pilot either pressurized his drop-tank or monitored his fuel quantity, the emergency would have been avoided. Every pilot can learn from this incident . . . even the simplest procedure should never be overlooked. — Capt. D.H. Tierney, USMC, A-4 Analyst, Naval Safety Center. ◄

No Fueling Around

By Ltjg. Jim Hicks

WE were back in the Med again. Our winter IO cruise had been cut short and the ship was called back into the familiar waters of the Mediterranean Sea. Exiting the Suez Canal was a rude awakening — it was winter time! The calm seas of the IO were no more. The Med greeted us with pitching decks, 4-degree glide slopes, chilly temperatures and high, gusty winds. It was on such a night that my pilot and I briefed as the spare for a SSC hop. It was fairly routine since we had been flying together for three months. Tonight we would carry four MK 20 Rockeyes as part of the surface combat air patrol (SUCAP). This load, along with our three droptanks, made for a max trap fuel weight of 4,500 pounds. We had flown similar missions in the past few days, so it was nothing new. Since it was the fifth month of deployment, we were confident that we could get aboard the first time.

After a normal preflight, start and takeoff checklist, we talked about our chances of launching. The night was clear and VFR but nasty with high winds (40+ knots) and rough seas (10-15 feet). We both agreed it wouldn't be a good night for a swim. As you already have guessed, the go bird went down and we went to the cat.

The shot was normal and we were on our way. We spotted several Soviet combatants and took FLIR videotape while passing their position to the E-2C. We saw how rough the seas were on the FLIR and the tough time the Soviet destroyers were having.

The flight went smoothly until we noticed that the main fuselage fuel tank was down to 6,500 pounds although the wings still had 6,000 pounds. A quick discussion led to the obvious conclusion that we had a problem. We immediately climbed and went to max conserve. We went through our fuel transfer failure checklist with no results. We were now down to 5,000 pounds in the fuselage. The carrier was 80 miles away and it was 30 minutes until the recovery. After talking with our rep in CATCC we decided to dump the trapped wing fuel (it wasn't doing us any good), take 1,500 pounds from the tanker overhead and land early in the recovery.

The tanking went flawlessly and we commenced dumping our wings. The wings, however, only dumped down to 4,000 pounds. After repeated attempts to get rid of the trapped fuel, we told our rep we would need to jettison our ordnance in order to be below max trap, which would now be just 3,500 pounds of fuel in the main bag. After clearance to a clear area, we jettisoned our Rockeyes and MERS. All in all we weren't looking too bad; with some quick vectors from CATCC we would be aboard shortly.

The next few minutes went fine. We called the ball at 3.0, flew a beautiful pass to a pitching deck, then were surprised to hear that dreaded "Bolter, bolter, bolter!" call. What? The ball was centered all the way, on speed, on centerline, good attitude, but the hook had skipped the three and four wires. We were mad — it was our first bolter in three months!

We spotted our squadron mate who

was hawking us with the tanker at our 10 o'clock. We cleaned up and joined. The tanker was at 2,500 feet and we experienced some light to moderate turbulence, but we were in the basket in a few minutes. This tanker had just given us 1,500 pounds a few minutes earlier but now it was sour. We backed out and plugged again with the same results. Fortunately, the tanker crew had kept us in the pattern. With our fuel state down to 2.2 and the next cycle's tanker out on a CAP station, things were getting tense.

The decision to go for another landing was made by Air Ops and we were in good position to descend and turn to the final bearing. Another good start and everything was looking good at three-quarters of a mile. We called the ball at 1.9. It was a carbon copy of the first pass — including the hook skip three and four wires. We were in real trouble now — no tankers available, nasty weather and our tailhook bouncing like a ping-pong ball. I thought back to our pre-launch conversation about this being a bad night to have to eject.

Immediately we heard our skipper's voice on the radio. "Turn downwind VFR." Although it was nighttime, we flew to a day 180-position and turned in. With the low-fuel light about to come on, we knew we only had a few minutes left. If we boltered again, they undoubtedly would rig the barricade. With a few sugar calls from the LSO, we caught an "OK" one wire. We were relieved and so were the guys still airborne. A barricade at the beginning of the recovery would have meant more low fuel states in the air wing.

In our debrief we talked about the following critical points:

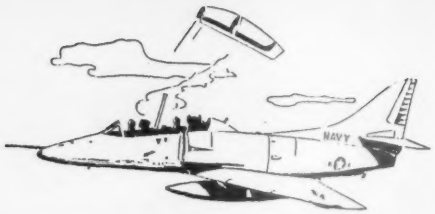
First, there is no substitute for good headwork and timely decisions both airborne and on the ship. When you've got a problem, let someone know!

Second, even though we always fly ready to eject, do we always fly ready to survive? That night, the wet or dry suit that we weren't required to wear (and didn't) could have been the difference between life and death.

Third, you can never check your fuel state too often. Catching a problem like this early is the key to a happy ending.

Last, but not least, never underestimate mother nature. Flying from the ship, we fly in all sorts of weather. Our job has to be done regardless of winds, temperature or sea state. It sets us apart from other aviators, but a little extra caution, a few minutes more in the brief and sound crew concept can make life aboard the boat a little less exciting.◄

Ltjg. Hicks is an A-6 bombardier/navigator in VA 85, recently returned from deployment in USS *Saratoga* (CV 60) in the Mediterranean.



IMPROVISATION

A Survivor's Most V

REMEMBER the Ronco-matic? It sliced, diced, caught fish, started fires and accomplished a plethora of other tasks. How could such a compact device do so many diverse things? The answer is simple: improvisation. A particularly creative engineer probably sat down with the gadget and listed its imaginable uses. Those are the same type of people who can find a dozen ways to employ a Dzus key.

Someday you, too, may have to adapt your equipment to do something totally different from its intended purpose. Specifically, I'm referring to a survival situation. Regardless of the equipment at your disposal, you will have certain unexpected needs. It will be up to you to find a way to make your equipment satisfy them. This article briefly describes a few ways in which commonly carried flight equipment can be adapted. While perhaps it does not get as exciting as the "A-Team" making a tank from a golf cart, these adaptations and others can make the difference between your survival and your demise.

We've all heard that necessity is the mother of invention.

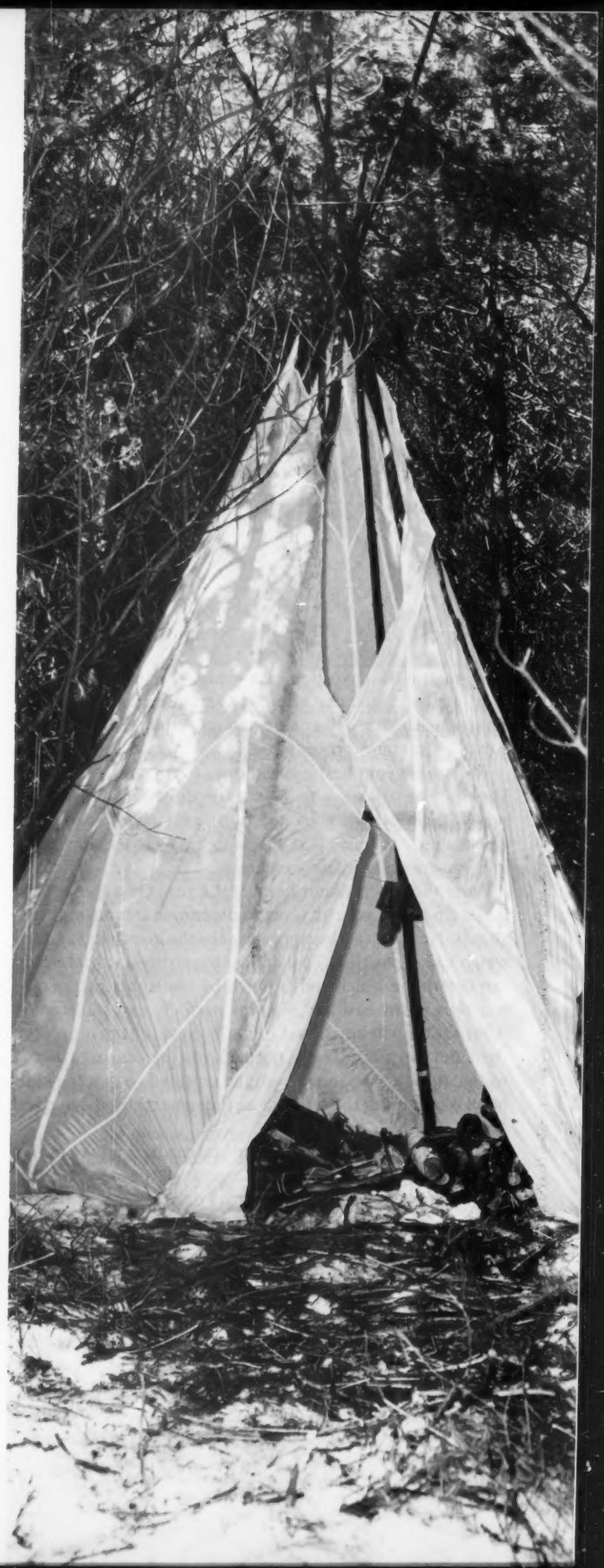
The extreme of this truism has been demonstrated by our prisoners of war (POWs). They were thrust into an environment devoid of the conveniences we are accustomed to, but historically they developed improvisational abilities spawned by this lack. One former Korean War POW, Mr. Jess McElroy, described an example in which a boot was "auctioned off" in his camp:

"When the Chinese finally got their supply line set up, in the winter of '52, the POWs got their first issue of tennis shoes . . . at 40 degrees below zero. At about that time an old worn-out combat boot came up for auction — not two boots, just one. It had a hole in the sole so big that even if you had cardboard you could not cover the hole to keep your foot off the icy ground.

"So what good is an old boot? The lace eyes could be cut apart, spread out and sewed into a blanket then laced to make it more like a sleeping bag. The upper leathers, after several days of soaking in soybean oil, could be cut and shaped into a softball cover for use the following spring. You could cut into the heel and save the little washers around the nails. Then you could melt down the heel and shape it into a core for that softball. Cut out the steel arch support. After several weeks of rubbing it on the rock steps in the compound, you'd have a very useful knife blade. Steal a few nails from the interrogator's fence for brads. You could use the fasteners from the heel for brad caps. Carve a birch handle to fit your hand. As long as you can keep it hidden you will have a very useful tool or weapon. Now, what am I bid for this old boot? Three cigarettes, one cup of sugar, two cups . . . who will make it three?"

By Lt. Micheal E. Filippell

Valuable Asset



An old boot that we might discard without a second thought was a gold mine for the POWs at Camp 3. Similarly, the list of uses for your flight gear will be limited only by your imagination.

For instance, building a fire is a top priority in most peacetime survival situations. But how many people realize that a normal flashlight can be used to start that fire? All you need is a small piece of steel wool, which can be stored indefinitely in the flashlight base. First, bend the wool into a "U" shape. Then, unscrew the reflector assembly exposing two metal tabs in the flashlight tube. Turn the flashlight on and touch the two tabs with the ends of the steel wool. It will ignite in a few seconds. Nurture the glowing ember with some tinder, and with a little patience you will have created a source of heat, light and companionship.

Another way is to use the lens of the reflector assembly to concentrate sunlight on a flammable object. In much the same way that a child learns to burn leaves by focusing the sun's rays with a magnifying glass, we can use the lens of the flashlight to heat a spot on a piece of dry tinder to the point of ignition. Another effective way to start a fire is to insert a cigarette butt or some other piece of tinder in place of the flashlight bulb. By pointing the reflector at the sun you will concentrate its powerful rays on a spot on that tinder. On a sunny day it should take less than a minute to "get a light" in this way.

You may unknowingly have additional items available that can help fuel your fire. A white plastic spoon such as those packed in in-flight rations, for example, will burn nicely. Just push the handle into the ground to support it upright and light the tip. The "spoon-candle" will burn for approximately 10 minutes — long enough to ignite some more tinder or kindling. A word of caution, however; petroleum products, like spoons, burn easily but their fumes are toxic. Plastic should only be lit in a well-ventilated area.

A tube of chapstick can be used for more than just "lip service." By smearing some chapstick on a wad of cloth you will greatly enhance the material's usefulness as kindling. It will burn hotter and longer and will ignite more easily than untreated cloth. Or, use a twig about the size of a toothpick to push a piece of thread or string into the chapstick tube. In so doing you create a candle that will provide light for hours.

By mixing the chapstick with some ashes or with berries, leaves or bark, you can also create an effective camouflage makeup paste that will adhere to your skin or clothing while providing sunburn protection.

Want to get your bearings without a compass? No problem. There are many ways to determine direction. At night a survivor can use the stars and during the day he can use a wristwatch. Assuming that your watch is set to local time, the following method is fairly accurate.

Point the watch's hour hand at the sun. On a hazy day it may help to use your shadow to determine the sun's whereabouts. Now, bisect the angle between the hour hand and the watch's 1200 position. That defines the north-south line. You can determine which end is north by remembering that the sun rises in the east and remains partially east until noon. After that it will be at least partially west. Put east on your right and you will be facing north. If you are wearing a digital watch, draw a clock on the ground oriented so that the hour hand is pointed at the sun and use the same method described above.

Keep your watch handy. The crystal can be used as a mirror for signaling rescue aircraft or search parties that may be miles from your position. Reflective devices are surprisingly effective on hazy as well as sunny days. If necessary, the watchband can be tightened around your wrist, forearm or ankle and used as a restricting band to inhibit bleeding. Some metal bands are shiny enough to be useable as bait for an animal trap or as fish lures. Just attach the shiny band to a hook made from a wire, a safety pin or even a sharp branch. The band may be swallowed with the hook but you will be able to recover it at dinner time.

Watches also make universal bargaining tender, not to mention their unmatched ability to tell you what time it is.

Fixed-wing aircrewmen will be happy to know that there are countless uses for a parachute after it has brought them to terra firma. The canopy can be cut into individual gores and used as tent material, bedding, Arab headdresses, foot coverings, gaiters, wristlets, clothing, bandages, slings or laid out on the ground to form ground-to-air signals.

Each suspension line has a 550-pound tensile strength and can be used for lashing or tying shelter frames together or can be separated into several "corelines." These strings have a 35-pound tensile strength and can be used for fishing line, sewing, weaving or emergency suturing. The corelines do not absorb water so they are ideal for weaving fishnets as well.

For protection against glare or snow blindness, you can take a 6- to 8-inch strip of parachute harness (2½-inch strap) and cut eye slits in it about 3 inches apart. This is worn like a pair of sunglasses by tying suspension line to it. To further reduce glare, you can blacken the strap with some soot and fray the edges of the eye slits.

Parachute material is effective as trail markers by tying strips of the canopy to trees along a path. It makes good sea anchors, sandbag material or even map material. It is rugged and can be drawn on and folded for easy carrying.

Rotary wing crewmen probably don't have a parachute but may be able to salvage articles from their aircraft if they enter survival via an emergency landing.

ICS cords, for example, are nothing more than flexible rubber tubes with insulated wires running through them. If you remove the wires by pulling them out one end, the tube remaining can be used for drawing water from the bottom of a solar still, a vegetation bag or a beach well. It also makes an excellent restricting band or tourniquet and can be used to support an arm sling or to secure a splint.

The wires that you removed from the ICS cord are your building blocks for snares, fishline or even fishnets. If you strip the wire, the insulation can be used to help start a fire by sprinkling bits of it into your tinder. The stripped wire can be used for anything from tent lines to toothpicks.

The canvas bench seats in many helicopters can be removed and used to construct a hammock or tent. They can also be cut up and used in many of the same ways described for parachute material.

To be most comfortable in extreme temperatures, don't use an aircraft fuselage as a permanent shelter. The metal conducts heat and will not effectively protect you from the heat or cold. If possible, construct your shelter with parachute material, seat canvas or any other appropriate material.

Survival in any hostile environment depends, to a great extent, on one's ability to meet his needs through improvisation. The following rules will help you adapt equipment to meet your needs.

- Determine these needs.
- Inventory your possessions and available materials.
- Consider all alternatives to solving those needs.
- Select the alternatives that provide the most efficient use of your materials, time and energy.

Just as aircrews rehearse emergency cockpit responses while under controlled conditions, it is prudent to consider survival techniques while in comfortable surroundings. Take a few minutes while you are waiting for your next flight brief or AOM and brainstorm the potential uses of some piece of your gear (e.g., your flashlight, wristwatch or parachute). You will probably surprise yourself by the number of new uses you will concoct. More importantly, you will exercise your creativity — the survivor's most valuable asset.

To alter an old expression: "Give a man a fish and you feed him for a day; give him a ICS cord and he could practically open a sporting goods store!"

Lt. Filippell flies the C-12 for NAS Glenview, Ill., and was previously assigned to the West Coast SERE school as an instructor.

Survival Equipment: A Fleet Perspective

By Cdr. H.D. Connell

COLD weather survival receives special attention from the 17 pilots of VA 27. When not deployed, we cope with both high mountain and desert survival from our home base of NAS Lemoore. We recently embarked in NORPAC and the Sea of Japan, which gave the squadron an additional perspective on the hazards posed by cold weather flying. A particularly frustrating aspect of survival preparation, however, is the dichotomy between what the aviator requires and what supervisory authorities permit him to carry.

Our mid-cruise maintenance/material inspection pointed out all too clearly the disconnect between what is needed and what is allowed. The all-weather matches advocated by the February 1985 Approach article on cold weather survival will automatically earn a grade of unsatisfactory in the safety and survival equipment category if they are discovered in your pilots' flight gear. Reserves of food, dry socks or supplemental signaling devices, unless attached by lanyard, will also earn immediate discrepancies.

Who is driving the train here? Has the Navy lost sight of the forest for the trees? Is it more important to equip our aviators for survival in the face of well-identified environmental hazards or to ensure inflexible control over the program by the bureaucracy ashore?

I have no doubt that our equipment procurement offices and configuration managers have the fleet's best interests at heart. Introduction of both SEWARS and the FLU-8 illustrate excellent, if ponderous, responses to clearly established fleet needs. What is surprising, however, is the degree to which the decision process is apparently divorced from consultation with fleet customers as to how the needs should be filled. Too often, aircrew survival bulletins, which are mandatory upon receipt, arrive, quite literally, out of the blue, without advance notice, without explanation and without consultation at the operational level.

The unfortunate result of this process goes beyond just the poor communications and professional frustration felt by the operating unit.

The perception is that the people responsible for managing survival programs are out of touch with the realities of fleet operations, or are more concerned with the exercise of absolute control than with the welfare of the individual aircrews. A climate of mistrust must not be allowed to permeate our critically important safety programs.

Where is the harm in giving fleet users an opportunity to comment on configuration proposals or management intentions before the issues are resolved? Prior consultation makes good sense from both safety and management standpoints. More inputs should help to ensure that survival products, whether hardware, configurations or procedures, will do the best job possible of saving lives under conditions encountered by the men and women of the operating forces. Perhaps as important, the consultation will smooth the feathers of the fleet customer, who is often suspicious of changes directed "from ashore." A satisfied customer will be less prone to either disregard the product entirely or comply only during the period the inspection team is on board.

We must do better at establishing good rapport between the aircrews facing fleet risks and the shore establishment managing our survival programs. Increased participation by fleet users is an important aspect, as is a more enlightened approach to permitting small item modifications to suit the hazards of specific operating environments. ◄

Cdr. Connell is an A-7E aviator and previously commanded VA 27. He is currently stationed in Washington, D.C.

Survival Equipment: A Rigger's Perspective

By PRCM D.B. Leighton

Cdr. Connell's article on survival equipment repeats an often heard but incorrect belief. The fleet *does* have inputs on both new survival equipment and modifications to existing gear. Aviation Life Support System (ALSS) items are sent to fleet units for test and evaluation via the Type Commanders. They assign units to evaluate the item and provide feedback. The results are then submitted to Naval Air Development Center (NADC) for further evaluation.

A frequent problem is a favorable endorsement by the evaluation unit, but dislike of the item by other fleet users when it is introduced Navy-wide. An example of this was ACSC #465, the oxygen mask bag. The units that participated in the evaluation reported favorably on the item, but when it was introduced to the fleet, many squadrons disliked it. Aircrews complained that it was too big, too bulky, that it got in the way and obscured vision. Apparently, different aircraft communities flying different equipment have different requirements. Therefore, I agree with Cdr. Connell that more user input would be beneficial, but the research, development, trial and evaluation cycle does need control to be effective.

Cdr. Connell's assumption that the shore establishment has total control over new-item inputs into the fleet is not entirely true. There are many avenues to correct problem areas with ALSS or to introduce new items to the fleet user. Quality Deficiency Reports, Maintenance Action Forms, Technical Publication Deficiency Reports, Beneficial Suggestions and plain old messages and letters highlighting questions or problems are all examples of ways the fleet can affect ALSS items. The problem is that all too often users are not aware of these methods, and thus fail to make NADC and NAVAIR aware of their inputs.

The survival gear procurement, maintenance and modification process is extremely complex and time-consuming. This is a result of the nature of the beast, rather than an attempt by the shore establishment to "exercise absolute control." Cdr. Connell is absolutely right, though, when he stresses the importance of communication between the user and the supplier. The user must tell the supplier what he wants and what he doesn't like about existing gear before the supplier can correctly respond.

PRCM Leighton is the survival gear analyst for the Naval Safety Center.

Naval Weapons Center, China Lake, surrounded by desert and dry lake beds, may seem an unlikely place for high-altitude mountain search and rescue, but NWC's helicopter crews have performed the nation's highest altitude rescues. China Lake and its ranges are in the northern Mojave Desert. This high desert area is bounded by the Coso Mountains to the north and the Sierra Nevada Mountains to the west. Although spectacular, the beauty of the High Sierra can hold danger for the aviator and outdoorsman, and in two recent incidents, NWC SAR crews were called on to save a life. They succeeded in spectacular fashion and were formally recognized for their efforts.

Lt. Mark S. Eoff
Lt. Timothy J. Cleary
AD2 Richard Tavenner
AE3 Mark Keenan.

Lt. Timothy J. Cleary
Lt. Mark S. Eoff
AD2 Richard Tavenner
AE3 Mark Keenan

A critically injured climber was stranded on a narrow ledge near the summit of Mt. Whitney, the highest peak in the contiguous U.S., with an elevation of 14,495 feet. Lt. Timothy Cleary and his crew were called out to assist in the rescue attempt. As the SAR Mission Commander, Lt. Cleary knew the only way to operate at the high altitude of the rescue site would be to remove all extra weight from the SAR Huey, including the 175-pound rescue hoist. Its weight and boom arm would change the aircraft center of gravity and make operation unsafe in the turbulent winds, extreme downdrafts and updrafts, and a high density altitude created by the warm temperatures and height. An additional consideration was the mandatory minimal fuel load of 500 pounds, barely enough for 30 minutes total flight time.

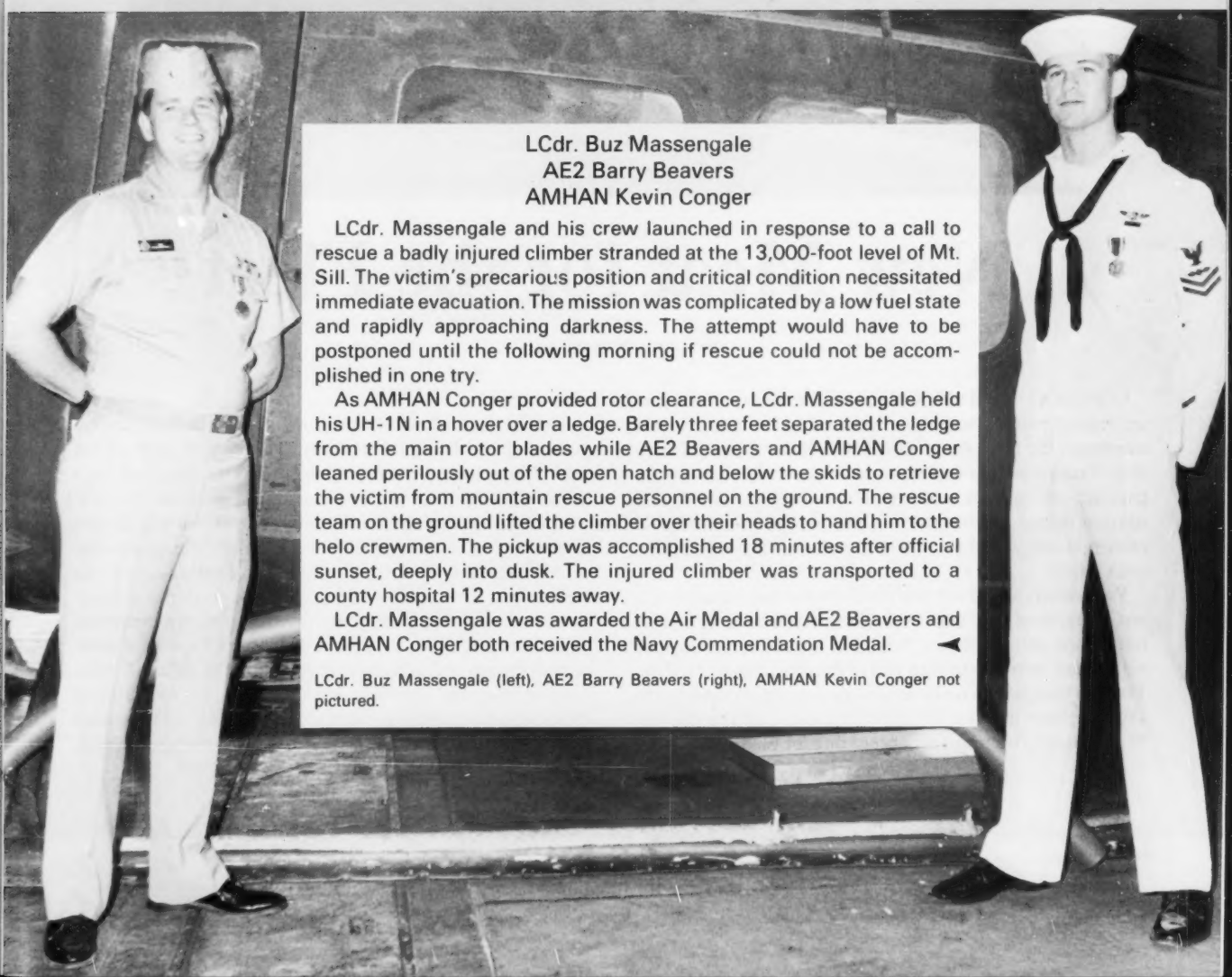
With Lt. Eoff as co-pilot and AE3 Keenan as crew chief, Lt. Cleary flew

BRAVO ZULU

the aircraft from the 4,000-foot MSL valley floor to the victim's position. While Lt. Eoff monitored aircraft and engine instruments, AE3 Keenan guided the aircraft into an out of ground effect hover at 14,400 feet on the north side of the mountain.

As Lt. Cleary held a steady hover, AD2 Tavenner rappelled from the helicopter and secured his rope to the victim and litter. He then signalled to the crew chief and pilot, and with the aircraft operating at the edge of its performance limits, Lt. Cleary lifted the helo up and clear of the mountain. AD2 Tavenner straddled the injured climber in the litter slung 100 feet below the helicopter while they flew the 15-mile distance and 10,000-foot vertical descent to the valley floor and hospital.

For their efforts in saving a life, Secretary of the Navy John Lehman awarded Lt. Cleary and his crew with the Air Medal during ceremonies at NWC. Secretary Lehman praised the crew for their superb, aggressive airmanship and skill. The Naval Helicopter Association also recognized this crew by naming them the 1985 Aircrew of the Year.



LCdr. Buz Massengale
AE2 Barry Beavers
AMHAN Kevin Conger

LCdr. Massengale and his crew launched in response to a call to rescue a badly injured climber stranded at the 13,000-foot level of Mt. Sill. The victim's precarious position and critical condition necessitated immediate evacuation. The mission was complicated by a low fuel state and rapidly approaching darkness. The attempt would have to be postponed until the following morning if rescue could not be accomplished in one try.

As AMHAN Conger provided rotor clearance, LCdr. Massengale held his UH-1N in a hover over a ledge. Barely three feet separated the ledge from the main rotor blades while AE2 Beavers and AMHAN Conger leaned perilously out of the open hatch and below the skids to retrieve the victim from mountain rescue personnel on the ground. The rescue team on the ground lifted the climber over their heads to hand him to the helo crewmen. The pickup was accomplished 18 minutes after official sunset, deeply into dusk. The injured climber was transported to a county hospital 12 minutes away.

LCdr. Massengale was awarded the Air Medal and AE2 Beavers and AMHAN Conger both received the Navy Commendation Medal. ◄

LCdr. Buz Massengale (left), AE2 Barry Beavers (right), AMHAN Kevin Conger not pictured.

Peter Mersky

New Meat for the Fleet

By Lt. Marc P. Steinhilber

CONGRATULATIONS. You just finished the FRS and are feeling pretty good about yourself. After all, you just completed the most demanding training the military has to offer. From your first hop in primary to your last night carrier landing, you've been working your tail off and are finally starting to feel comfortable in your new jet. You're a **real** carrier pilot now. The pressure for grades is off and it's time to relax a little.

Your orders arrive and you're off to your fleet squadron. It just so happens they deployed two weeks earlier, so you fly out to meet them on cruise. It felt like it had been a long time since I had been on the back end of the ship, but no big deal. You're a fleet pilot. You have a few days to get accustomed to ship life, then it's time for your first hop with the skipper. With a little extra time spent preparing for the brief, you are ready to go.

The first hour of your debut goes fine. You launch, rendezvous, stay on the right frequency and maintain sight of the lead. You're being a good wingman for the skipper. Not only is this the first time you've carried 2,000 pounds of exotic weapons in a real-world hostile environment, but it is also the first time you've been concerned with the fuel management problems associated with a drop-tank and reduced max trap fuel weight. Fortunately, the drop-tank transfers as advertised, and with wing transfer off, the main tank depletes down to max trap. It's time to turn the wings back on, but for some reason the gas isn't going where you need it. You're 200 miles from mother and suddenly don't have the gas available to make it home or to the pre-briefed divert. Now, which switch makes which thermistor do what? When was the last time you

even looked at the fuel system in NATOPS? Was it eight months ago in the RAG's ground school?

Well, now you've got to tank and it won't be just a down and a refly if you miss. Did you ever study the refueling procedures with a drop-tank installed? You make it to a tanker and get enough gas to end up on the ball with 500 pounds available. You have only one shot — it better be good. Fortunately, you get aboard with nothing worse than some frazzled nerves, but the possibilities for a disaster were astronomical.

Your next hop is that same night, by yourself. This isn't canned like CQ in the RAG, but after all, you do have eight night traps. Marshal puts you at angels 6. Great! You'll be the first one down. Maybe you'll catch the end of the movie. You do your best to push on time since the skipper is probably in CATCC watching. The ship's final bearing changes more times than you can count and compounds your lineup problem. No sweat, just take a peek at five miles and see how it's going. Where are the droplights? They were there during CQ. Four miles, three miles, you start down. Two miles, one mile — where's the ball and droplights? CATCC says, "Right of centerline, above glide path, three-quarters of a mile, call the ball." Before you can say "Clara," the lens comes on the day position and then gradually dims throughout your "Yahoo" pass. You get aboard with a solid (OK) and now know what a "sacrificial lamb" is.

The next day you get another chance to excel. You launch and everything looks good. Gear-up, three-up and locked. Time to go to ISO. Now the nose goes unsafe. You slow down and climb to join your lead. Sure enough, the launch bar is sticking out from the nose-gear doors. When was the last time you got in the NATOPS and really studied the launch bar system? You get the gear down and the launch bar retracts. Your mission is scrapped and you land on this recovery.

LCdr John Leenhouts

Peter Mersky

At least you've got a second chance to fly an "uneventful" hop that night. You launch by yourself and have an uneventful mission. You are marshalled at angels 12. Luckily, you're not the first one down! You get to marshal and the TACAN quits. Well, it's just an annoyance because you've got SPN-41 and a good system. On the way down your cockpit lighting starts to go haywire. The lights in your HSI, ADI and AOA quit. You get aboard, but once again your workload was more than you planned.

Some of these emergencies were minor and merely an inconvenience, while others were more serious. Nevertheless, any of them could have started a chain of events with catastrophic consequences. One almost did.

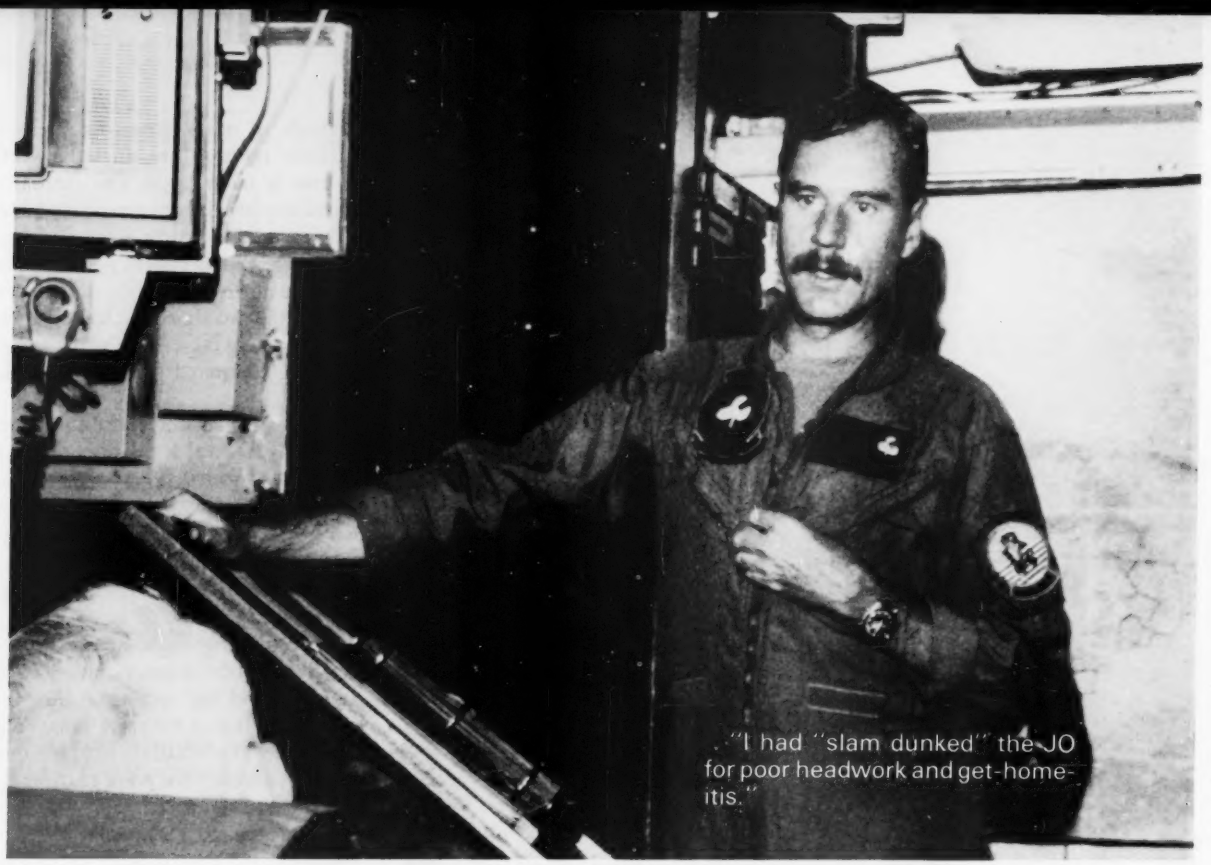
What can we learn? First, very little is a canned evolution out there. We must think about "what-if" situations from time to time — both the major and minor kind. Second, when you haven't flown for quite awhile, even more time needs to be devoted to "thinking flying" before getting back in the cockpit. Third, know your aircraft. Get in the NATOPS and keep going back to it. It is not a learn-and-leave book. Your systems knowledge will deteriorate unless you stay with it. Fourth, once you finish the RAG, it's no time to let up. At that point, you're an apprentice. It's time to keep studying, to learn your warfare specialty and your NATOPS even more.

The learning process never ends. A lapse in keeping up with NATOPS procedures and aircraft systems can bite the oldest salt as easily as the newest guy on the block. Get back in the good book, stay with it and be prepared! ◄

Lt. Steinhilber was a flight instructor with VT 25. He currently flies A-7Es with VA 46 off USS *America* (CV 66).

1-800-HOT-SFTY

Your safety number for all reasons. Use it.



"I had "slam dunked" the JO for poor headwork and get-home-itis."

"Bless Me XO, For I Have Sinned . . ."

By Cdr. D.R. Bouchoux

I sensed it was wrong from the moment I finished. While what I had said was true, the forum and my manner were wrong. At an AOM, in a latter-day episode of "True Confessions," a junior officer had related an experience from his past weekend's cross-country which involved landing at a field fraught with dangers. Taking advantage of the XO's next-to-last work spot in the AOM lineup, I had "slam dunked" the JO for poor headwork and get-home-itis. In looking around, though, uncomfortable expressions covered the faces of the other JOs, as if to say, "If he hadn't admitted it, he wouldn't have been chewed out." I could sense that in the future, they all might be reluctant to admit to errors in judgment.

Having mulled this over that night, I called the JO into my office the next morning to explain that, while I still thought that he had displayed bad judgment, the public defaming was not warranted; I encouraged him to continue to share such (hopefully rare) instances from which we could all benefit. At the next AOM, I also explained this to the assembled horde.

On the formal side of aviation safety, Mishap Investigation Reports are held sacrosanct and apart from the legal system, either civil or military. This enables the Navy to investigate mishaps in an atmosphere of total honesty and to learn the maximum number of lessons from the experience. For less severe occurrences and in a much less formal arena, "true confessions" at an AOM can provide the same sort of forum for lessons learned. To be effective, though, the spectre of public reproach must be absent, whether from superiors or peers. The act of admitting to less than perfect judgment underscores the realization that the action taken could have been better; if more direct counseling is deemed necessary, it can be handled privately. The verbal give-and-take in discussing an event, as well as the description of the circumstances, can prevent the recurrence of similar incidents that could have more disastrous consequences. The command that fosters such self-analysis will also find that it benefits all aspects of their operations. Instead of just being able to say, "We were sure lucky on that one," everyone can derive valuable training.

Just as it isn't nice to fool mother nature, it isn't nice to surprise the XO at an AOM. If it is a safety item that is the cause of the surprise, however, a "go for the throat" reaction will only stifle the ability of the command to learn from mistakes. ◄

Cdr. Bouchoux is the executive officer of VF 1. He has served tours in F-4s and F-14s, and has logged over 700 arrested landings.

True or Magnetic North?

By Lt. David Legerton

WHILE flying a long patrol mission over chilly northern waters, the new 3P noticed a 20-degree split between his BDHI heading and that of the patrol plane commander (PPC). The PPC commented that he had just switched to magnetic heading; the change back to true brought the compasses into agreement.

The co-pilot remained puzzled by the large split between the magnetic and true headings. He had never witnessed such a dramatic difference. The seasoned PPC explained to the new pilot, "Because the magnetic north pole and geographic north pole are separated by hundreds of miles, from our present northerly position, the angle between the two is fairly large. The inertially derived true heading reference is oriented to the geographic north pole, while the magnetic compass system points to the magnetic north pole. Large differences between the two are not noticeable back in the training command in the lower latitudes, compared to up here in the north."

As a new navigator in the squadron who had overheard the discussion, I thought the PPC's initial explanation seemed plausible but after a second or two of thought, I realized that there was much more behind the compass split than just the difference in location of the two poles.

Since that time I have heard aviators explain about deviation, variation, compass lead and lag, and again how the compass points to the earth's magnetic north pole. The fact of the matter is that the compass *does not* point to the magnetic north pole. An example will illustrate this point. The magnetic north pole is located near Bathurst Island, one of the Parry Islands above mainland Canada, approximately 103 degrees west longitude. It would stand to reason that if the compass pointed to magnetic north there would be no angular difference between the magnetic and geographic north poles along the 103-degree meridian directly south of these poles. However, one will find between 10 to 12 degrees east difference between the two along this meridian in the continental United States.

What causes this angular difference between geographic true north and magnetic north, or (as it is commonly called) the magnetic variation, at a given locality?

The earth has a geomagnetic field that shares some of the basic properties of a bar magnet. A north and south magnetic pole are present but, unlike the bar magnet, these two poles are not located exactly opposite each other as on a straight bar. As a matter of fact, at any one time there can be more than two magnetic poles on the earth. The bar

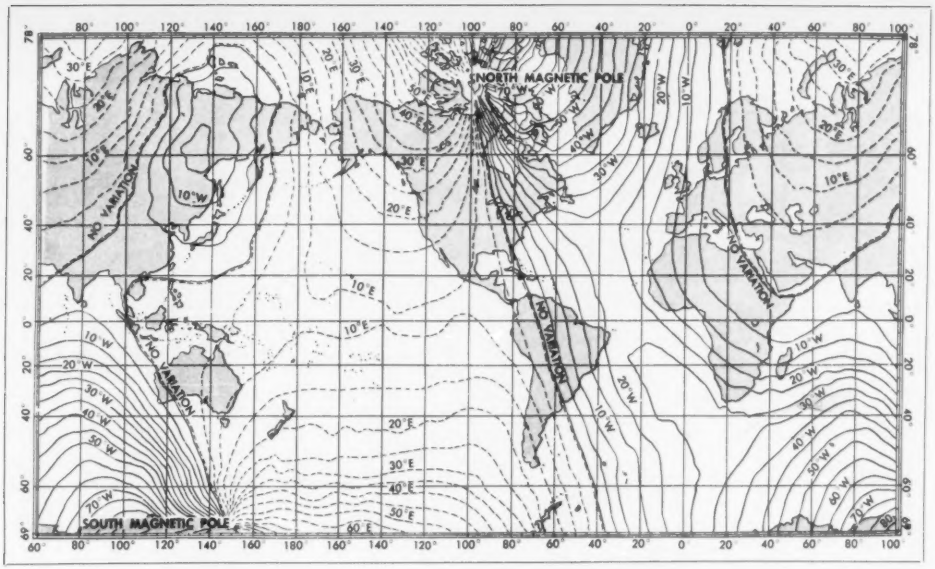


Figure 1. Isogonic Lines

magnet has relatively constant lines of magnetic force connecting the two poles. The earth also has these lines of magnetic force but they are highly irregular in many areas and are constantly changing. For example, the variation in London has gradually changed from approximately 10 degrees *east* in the year 1607 to 24 degrees *west* in 1823 before moving eastward to the present value of 6 degrees west. These changes in magnetic variation are not constant but vary at different rates worldwide. Observations indicate that in the middle of the United States the magnetic variation changes a whole degree in about six years. This can explain the occasional renumbering of runways and magnetic courses. Besides the more or less regular changes of the earth's magnetic field and variation, irregular disturbances are also observed. A common cause of these irregular disturbances is linked to sunspot activity.

What then does the magnetic compass point to? The magnetic compass does not necessarily point to any one thing but aligns itself with the omnipresent lines of magnetic force at that particular locality. It will normally point in a northerly direction because of the directive force of the earth's magnetic field — its polarity. Geological evidence gained throughout the 20th century suggests that the north and south poles have changed polarity several times throughout the life of the earth. There are also indications that we are now experiencing a reversal of the earth's magnetic field. The change will not occur in our lifetime.

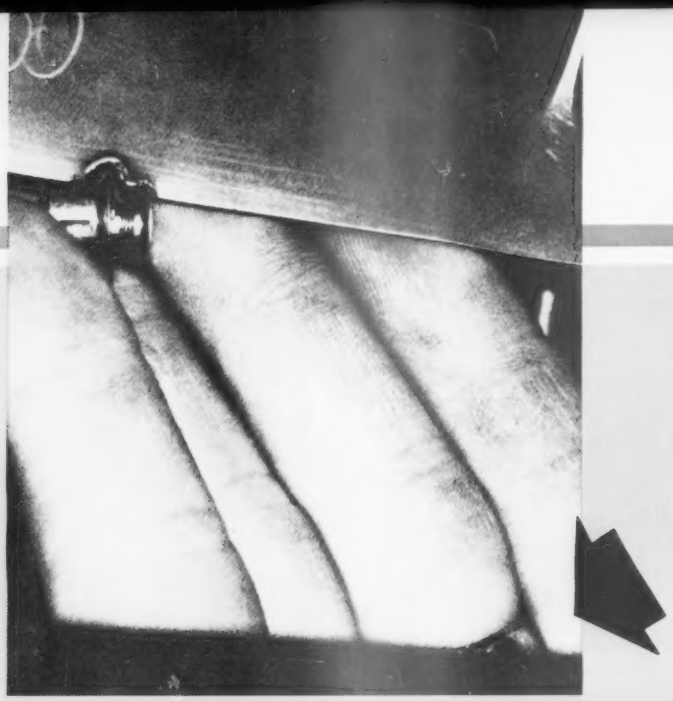
An important point to recognize is that even though complex and reliable navigation systems are used in today's aircraft, these systems do have errors. Any good attack pilot will agree that preparations should be made to use standby magnetic compass systems and dead reckoning/visual navigation along any portion of the strike. Since tactical pilotage and similar charts of this sort are oriented towards true north, and our magnetic compass systems are aligned along lines of magnetic force, the local variation in degrees east or west, as appropriate, must be applied as a correction. The magnetic variation is derived from worldwide observations, and periodically new charts are published, imprinted with lines connecting points having the same variation. These lines, called isogonic lines, can easily be found on the above chart and the variation noted. Compensation for the variation is normally computed as a correction to true heading. To go from a true heading to a magnetic heading, degrees of west variation would be added and degrees of east subtracted. The rule of thumb for this correction is easily remembered as "East is least" and "West is best." Thus, if our patrol mission was flown in an area where the variation was 20 degrees west and the true heading was 150 degrees, the relationship would be expressed as follows:

True Heading		Variation		Magnetic Heading
150	+	20 West	=	170

The compass is one of the oldest of scientific instruments with a history that dates back to the Chinese in the first century A.D., if not earlier. Over time, more became known of the earth's magnetic field and the first chart depicting magnetic variation was produced by Edmond Halley in 1701. Despite all the technological developments since Halley, the magnetic compass and systems dependent upon sensing the earth's magnetic field will continue to be important navigation instruments well into the future.

Lt. Legerton is a navigation instructor at the Naval Aviation Schools Command in Pensacola, Fla. He served a tour in VP 23 as the NFO training officer.

LETTERS



Re: Safety Poster (Feb '86)

NAS Glenview, Ill. — I enjoy your publication tremendously, as do my fellow Lions here at VP 90. Being the safety-conscious squadron that we are, we couldn't help but notice that the hand holding the stress-panel fastener on the inside back cover of February's issue is adorned with a wedding band.

In the interest of safety awareness, we reprinted the poster with a request that anyone who spotted a problem report it to the safety office. Results of our minipoll indicate that our maintenance types are eagle-eyed, as lots of "He's got a ring on!" reports were heard.

Our newsletter goes coast-to-coast, but we were caught off-guard when we got a call from NAS Dallas, where they had also spotted the offending jewelry!

AT1 David M. Gonzalez USNR-R(TAR)
Editor
Safety/NATOPS Newsletter
VP 90

• Our ears are "ringing" from comments such as yours since wearing any jewelry on your fingers or wrists is a serious maintenance "no-no."

Re: Safety Poster (Feb '86)

FPO Miami, Fla. — You recently printed a safety poster with the caption "A loose screw can *ruin* your whole day." It pictures a loose fastener, a hand and a *ring* on that hand. That brings to mind another safety poster I cherish, one with a caption about promising to love, honor, etc., *"and to remove a wedding ring on the job."*

That poster was a sore spot with me and my wife. We went around and around about me wearing my wedding ring at work.

I quickly changed her mind with a picture of what can happen if you do wear a ring on the job. That ended that, which leads to the question at hand. Are we really promoting safety? We might need to take a "*closer look*."

AT3 J.K. "Tex" Hulsey
HS-17/USS *Coral Sea* (CV 43)

• Your point has a very familiar ring. We do continue to advise that jewelry not be worn when operating or working on any machinery - including aircraft. Thanks for your close look. —Ed.

Re: P-3 Wheels Warning — Air Break (Mar '86)

FPO San Francisco, Calif. — A P-3 flight engineer, concerned about the P-3 wheels warning system, stated correctly that human error has caused the many gear-up landings in the P-3 community. He also suggested that it would be a waste to spend money on a new system to prevent the flight crew from ignoring their checklists.

Yes, chief, I agree that human error is the key to this dilemma. And it is hard to believe that a group of three professionals in one flight station would fail to accomplish this most critical step in the landing checklist. But it happens and will continue to happen unless we do something about it.

As the AEQAR for VP 48, I was recently involved with AFC-460, which is the incorporation of the new wheels warning system. This modification adds an audible warning to the existing flashing indicator light. It adds new circuits that activate the warning at specific airspeeds with respect to power lever position; the old system was activated only through the power levers. It also adds circuits that activate when the flaps are selected to the land position. It eliminates the possibility of suppressing the warning, which had been possible by depressing a switch on the co-pilot's console.

This new system is a great step toward eliminating the possibility of gear-up landings due to human factors. Since the warning cannot be cancelled, there is no alternative for the crew but to acknowledge the warning by lowering the landing gear or waving off the approach.

A waste of money, you say? Perhaps, but it could save your life or that of a shipmate. And consider the cost of replacing a stricken aircraft, now just a pile of scrap, because of some human error. I consider it money well-spent.

AE2 T.R. Murphy, AEQAR
VP 48

Re: Hazards of Winter Operations II (Jan '86)

Ottawa, Canada — I am writing in response to the article by LCdr. Towers and Mr. Perkins. The Canadian Forces operate two variations of the H-46 Sea Knight in a search and rescue role. With our northern environment, we often find ourselves in just the conditions described in parts of the article. This leads to a number of problems associated with ice and snow that we have been attempting to address. Basically these are:

- The risk of engine air starvation due to icing of the FOD screens.
- The risk of FOD damage due to ice forming in the engine duct, breaking off and being ingested.
- The risk of FOD damage due to flight or hover in heavy snow.
- The risk of jet engine icing when operating in visible liquid moisture in the +5 degrees to zero degrees Celsius temperature range.

We are conducting research and gathering further information on these topics in order to establish a data base from which to plan extensive icing trials on this aircraft in the winter of 1986-87.

Lt. Col. R.G.T. Nicholson
Directorate of Air Operations and Training
National Defence Headquarters

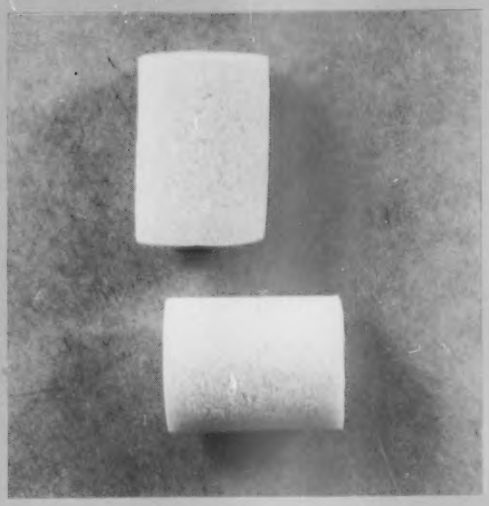
Approach welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: Approach Editor, Naval Safety Center, NAS Norfolk, VA 23511-5796. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Only you can prevent angels.

EVERYBODY

Buckle up.

Pick a pair



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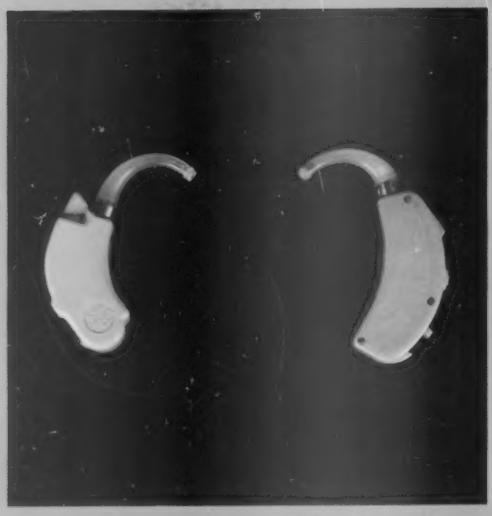

...and put in a plug for hearing conservation.

Poster idea contributed by Cdr. Bert Polk, III, PH3 Guido and DM1 Twardy, Safety Department, USS *Midway* (CV 41)